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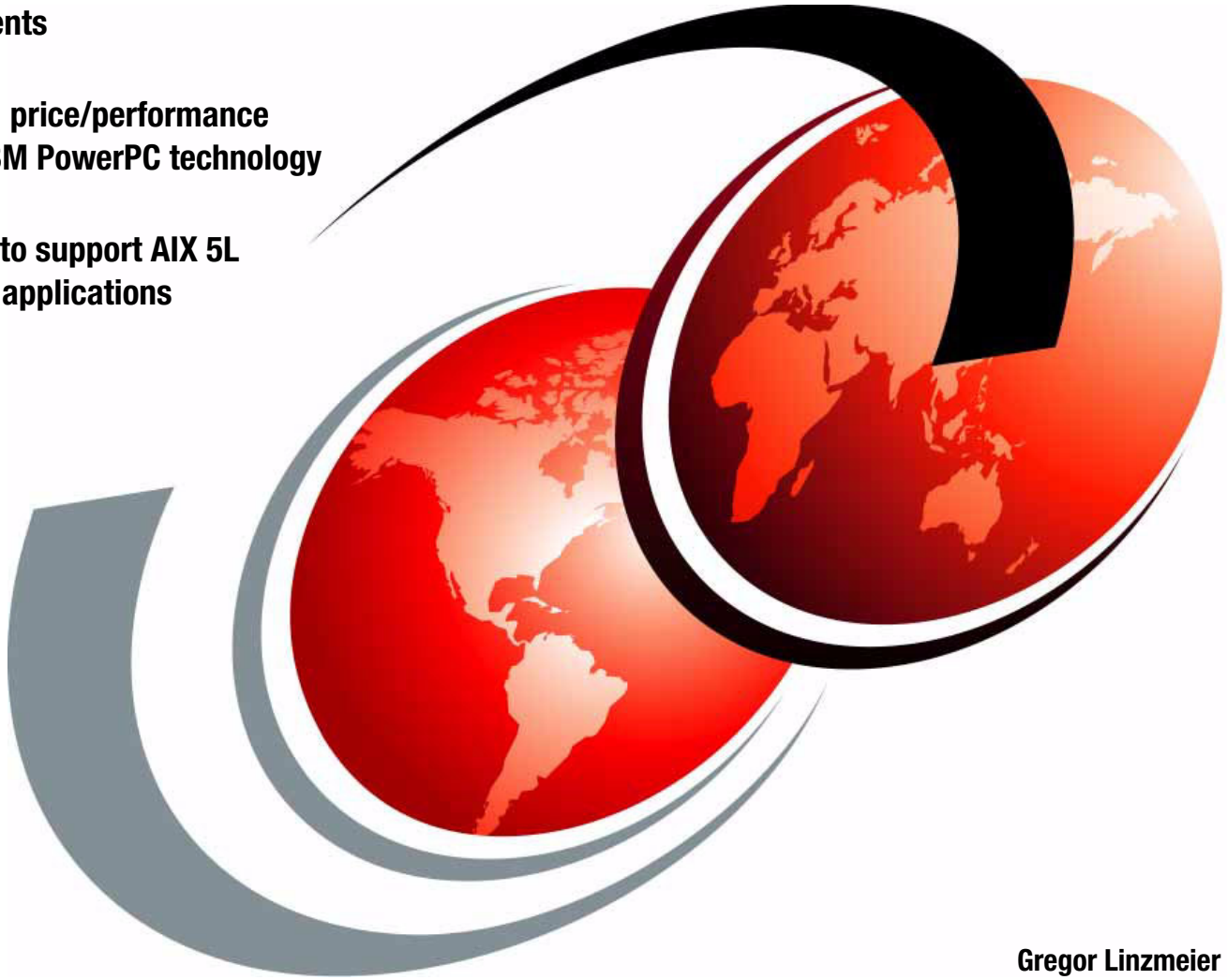
IBM System p5 185 Technical Overview and Introduction

- Application serving in distributed environments
- Exeptional price/performance through IBM PowerPC technology
- Flexibility to support AIX 5L and Linux applications



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Redpaper

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International Technical Support Organization

IBM System p5 185 Technical Overview and Introduction

April 2006

Note: Before using this information and the product it supports, read the information in “Notices” on page v.

First Edition (April 2006)

This edition applies to IBM System p5 185 (product number 7037-A50) and IBM AIX 5L Version 5.3, product number 5765-G03.

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Contents

Notices v
Trademarks vi

Preface vii
The team that wrote this Redpaper vii
Become a published author viii
Comments welcome. viii

Chapter 1. General description 1
1.1 System specification 2
1.2 Physical packaging 2
1.3 IBM System p5 185. 3
1.4 Minimum and optional features. 3
1.4.1 Processor features 4
1.4.2 Memory features. 5
1.4.3 Disk and media features 5
1.4.4 USB diskette drive 5
1.5 Express Edition offerings 5
1.6 System racks. 7
1.6.1 IBM 7014 Model T00 Rack 8
1.6.2 IBM 7014 Model T42 Rack 8
1.6.3 IBM 7014 Model S11 Rack 9
1.6.4 IBM 7014 Model S25 Rack 9
1.6.5 S11 rack and S25 rack considerations 10
1.6.6 The power distribution unit and rack content 11
1.6.7 Rack-mounting rules for p5-185 12
1.6.8 Additional options for rack. 13
1.6.9 OEM rack 14

Chapter 2. Architecture and technical overview 17
2.1 The PowerPC 970 processor 18
2.1.1 CMOS, copper, and SOI technology. 18
2.1.2 AltiVec enhancement 19
2.1.3 Available processor speeds 20
2.1.4 System bus 21
2.2 Memory subsystem. 21
2.2.1 Memory placement rules. 21
2.2.2 Memory restrictions. 22
2.2.3 Memory throughput. 23
2.3 Internal I/O subsystem 23
2.3.1 PCI-X and PCI slots, and adapters. 23
2.3.2 LAN adapters 24
2.3.3 iSCSI adapters 24
2.3.4 Graphics accelerators. 25
2.3.5 Flat panel monitors 26
2.3.6 Audio adapter 27
2.3.7 SCSI adapters. 28
2.3.8 Fibre Channel adapter 28
2.3.9 Additional support for owned PCI-X adapters. 28

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2.4 Peripheral ports 28
2.4.1 Serial ports 28
2.4.2 USB ports 29
2.4.3 SCSI port 29
2.4.4 Ethernet ports 29
2.5 Internal storage 29
2.5.1 Internal media devices 30
2.5.2 Internal SCSI disks 30
2.6 RAID option 31
2.7 Operating system requirements 31
2.7.1 AIX 5L 31
2.7.2 Linux 32
2.8 Service processor 32
2.8.1 Operator control panel 33

Chapter 3. RAS and manageability 35
3.1 Reliability, fault tolerance, and data integrity 36
3.1.1 Memory error correction extensions 36
3.1.2 First-failure data capture 36
3.1.3 Service processor 37
3.1.4 Fault monitoring functions 37
3.1.5 Environmental monitoring functions 37
3.1.6 Error handling and reporting 38
3.1.7 Availability enhancement functions 38
3.2 Serviceability 38
3.2.1 Service Agent 39
3.2.2 IBM Director 39
3.2.3 IBM customer-managed microcode 40
3.2.4 Service Update Management Assistant 40

Related publications 41
IBM Redbooks 41
Other publications 41
Online resources 42
How to get IBM Redbooks 43
Help from IBM 43

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Preface

This document is a comprehensive guide that covers the IBM® System p5™ 185 server. It introduces major hardware offerings and discusses their prominent functions. Professionals who want to acquire a better understanding of IBM System p5 185 product should read this document. The intended audience includes:

- Clients
- Sales and marketing professionals
- Technical support professionals
- IBM Business Partners
- Independent software vendors

This document expands the current set of IBM System p™ documentation by providing a desktop reference that offers a detailed technical description of the IBM System p5 185 server.

This publication does not replace the latest IBM System p marketing materials and tools. It is intended as an additional source of information that you can use, together with existing sources, to enhance your knowledge of IBM server and workstation solutions.

The team that wrote this Redpaper

This Redpaper was produced by a team of specialists from around the world working at the International Technical Support Organization (ITSO), Austin Center.

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1

General description

The IBM System p5 185 entry server (7037-A50) is designed for clients who are deploying Linux® or AIX 5L™ in distributed environments for application serving workloads. It is a follow-on to our successful RS/6000 Model 150 and 170 servers. The p5-185 offers the ability to accommodate business growth and expansion with inexpensive servers.

Especially for ISV application development on AIX 5L or Linux environments, the p5-185 is a flexible and easy managing system that uses the processor technology that is used in current available IBM Blade systems.

The p5-185 comes in a deskside or 5U rack form factor. The server is available with either a one-core or two-core 2.5 GHz PowerPC® 970 processor configuration with 1 MB of L2 cache per processor.

The IBM System p5-185 server has a base memory of 512 MB, expandable to 8 GB. The system contains three internal 3.5-inch disk drive bays and two 5.25-inch media bays. The media bays can contain a DVD-ROM, DVD-RAM, tape drive, or an additional fourth disk drive.

The p5-185 includes three internal disk bays that can accommodate up to 900 GB of disk storage using the 300 GB Ultra320 SCSI disk drives. A fourth disk can be installed using the second half-height bay to have 1.2 TB internal disk storage using the 300 GB Ultra320 SCSI disk drives.

IBM Director for pSeries V5.10, a new release of the systems management solution from IBM, will be available to IBM System p5 185 clients at no additional charge. While maximizing system availability, IBM Director is designed to reduce the cost and complexity of management by providing comprehensive yet easy-to-use administration of the entire environment from a single point of control.

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1.1 System specification

Table 1-1 provides the IBM System p5 185 general system specifications.

Table 1-1 IBM System p5 185 specifications

Description	Range
Operating temperature	5 to 35 degrees Celsius (41 to 95 Farenheit)
Relative humidity	8% to 80%
Operating voltage	100 to 127 or 200 to 240 V ac (auto-ranging)
Operating frequency	50/60 Hz
Maximum power consumption	450 watts
Maximum thermal output	1.536 BTU/hour[a]
Sound operating	4.7 bels[b] idle, 5.0 bels operating (1-core) 4.9 bels idle, 5.1 bels operating (2-core)

a. British Thermal Unit (BTU)
b. A unit of measurement of the loudness or strength of a signal, named after Alexander Graham Bell

1.2 Physical packaging

Table 1-2 provides the major physical attributes found on the IBM System p5 185 system. The p5-185 system is available as a deskside and as a rack version selectable by a feature code.

Table 1-2 Physical packaging of the IBM System p5 185 rack version

Dimension Rack	Range
Height	213 mm (8.4 in.)
Width	437 mm (17.2 in.)
Depth	491 mm (19.3 in.)
Weight	
Maximum configuration	25.0 kg (55.0 lb.)

Table 1-3 Physical packaging of the IBM System p5 185 deskside version

Dimension Deskside	Range
Height	469 mm (18.5 in.)
Width	216 mm (08.5 in.)
Depth without rear cover	491 mm (19.3 in.)
Depth with rear cover	640 mm (22.5 in.)
Weight	
Maximum configuration	25.0 kg (55.0 lb.)

When installed with the noise reduction rear cover, the p5-185 deskside model passes the quiet office (General Business 2D) requirements.

1.3 IBM System p5 185

Figure 1-1 shows a view of the IBM System p5 185, as the deskside and as the rack mountable version.

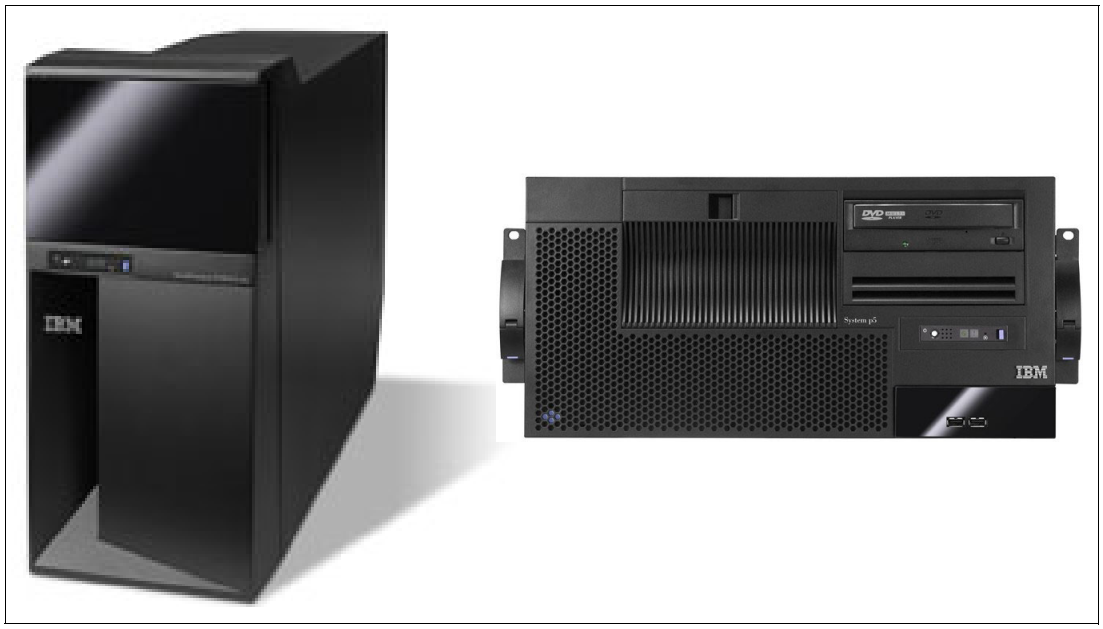

Figure 1-1 Front three-quarters view of IBM System p5 185

1.4 Minimum and optional features

The IBM System p5 185 system is based on the IBM PowerPC 970 processor technology which is soldered directly to the system planar. The minimum p5-185 configuration must include a processor, a processor entitlement, memory, hard disk, power supply, and a power cord.

The major features of the IBM System p5 185 system are:

- 1-core or 2-core 2.5 GHz PPC 970 processor with 1 MB L2 cache
- From 512 MB to 8 GB of total system memory capacity using DDR1 DIMM technology
- Three Ultra320 SCSI disk drives in a minimum configuration for a total internal storage capacity of 900 GB using 300 GB disk drives
- Five PCI slots (one short and four long):
  - Two 133 MHz 64-bit PCI-X slots
  - Two 100 MHz 64-bit PCI-X slots
  - One 33 MHz 32-bit PCI slot
- Two half-high bays for an optional DVD-ROM, DVD-RAM, or tape drive.

The IBM System p5 185 system supports the following native ports:

- Two 10/100/1000 Ethernet ports
- Two full-function serial ports on a single controller (that support HACMP™ heartbeat)
- Four USB ports (two front / two rear)

  An optional external USB diskette drive 1.44 (FC 2591)
- Ultra320 SCSI port

The p5-185 system features one internal Ultra320 SCSI dual channel controller, with an embedded internal connection to the internal disk drives and a 68-pin external port available.

1.4.1 Processor features

The IBM System p5 185 is available in a 1-core or 2-core configuration, using the PowerPC 970 microprocessor technology running at 2.5 GHz, both with 1 MB of L2 cache per processor. The initial order of the p5-185 system must contain the feature code of the desired number of processors, plus it must contain the processor activation code. For a list of available processor and activation features, see Table 1-4 and Table 1-5. IBM Capacity on Demand is not available on the p5-185.

Table 1-4 Processor and feature codes

Processors and FC	Description
FC 5324	1-core 2.5 GHz PowerPC 970 Processor Card, 0 activated
FC 5325	2-core 2.5 GHz PowerPC 970 Processor Card, 0 activated

Table 1-5 Processor activation feature codes

Activation feature	Description
FC 7310	Activation of one processor for initial order FC 5324
FC 7312	Activation of one processor entitlement for initial order FC 5325
FC 7312 x 2	Activation of two processor entitlements for initial order FC 5325

Ordering configurations that qualify for Express Offerings, described in 1.5, “Express Edition offerings” on page 5, allow the use of other, zero-priced entitlement feature codes.

1.4.2 Memory features

The system planar of the IBM System p5 185 system has four sockets for memory DIMMs. The minimum memory requirement is 512 MB, and the maximum capacity is 8 GB. Table 1-6 lists the available memory features.

Table 1-6 Memory sizes and feature codes

Memory and FC	Description
4462	512 MB (2 x 256 MB), DIMMs, 333 MHz DDR-1 SDRAM
4460	1 GB (2 x 512 MB), DIMMs, 333 MHz DDR-1 SDRAM
4661	2 GB (2 x 1048 MB), DIMMs, 333 MHz DDR-1 SDRAM
4463	4 GB (2 x 2048 MB), DIMMs, 333 MHz DDR-1 SDRAM

1.4.3 Disk and media features

The IBM System p5 185 server features up to three disk drive bays and two half-height 5.25-inch media bays. The minimum configuration requires at least one disk drive. Table 1-7 shows the disk drive feature codes that each bay can contain.

Table 1-7 Disks drives and feature codes

Disks and FC	Description
3579	73.4 GB 10 K RPM Ultra320 SCSI Disk Drive
3580	146.8 GB 10 K RPM Ultra320 SCSI Disk Drive
3581	300 GB 10 K RPM Ultra320 SCSI Disk Drive

See 2.5.1, “Internal media devices” on page 30 for a list of available media devices.

1.4.4 USB diskette drive

In some situations, an external USB 1.44 MB diskette drive for the IBM System p5 185 deskside system (FC 2591) is helpful. This lightweight USB attached diskette drive takes its power requirements from the USB port. A USB cable is provided. The drive can be attached to the integrated USB ports. A maximum of one USB diskette drive is supported per controller. The same controller can share a USB mouse and keyboard.

1.5 Express Edition offerings

Express Edition offerings are available on an initial order only. They provide a predefined configuration that is desired to meet typical client requirements. Zero-priced processor activations are available when a system order satisfies specific configuration requirements for the number of processors, total memory, quantity and size of disk drives, presence of a media device, monitor, keyboard, mouse, and audio adapter. When you purchase an Express Edition product offering, you are also entitled to a lower-priced AIX 5L operating system license, or you can choose to purchase the system with no operating system.

The lower-priced AIX 5L or Linux operating system is processed using a feature number on AIX 5L and either Red Hat or SUSE Linux. You can choose either the lower-priced AIX 5L or Linux subscription but not both. If you choose AIX 5L for your lower-priced operating system, you can also order Linux, but you will purchase your Linux subscription at full price versus the

reduced price. The converse is true if you choose a Linux subscription as your lower-priced operating system. Systems with a lower-priced AIX 5L offering are referred to as the System p5 Express, AIX 5L editions, and systems with a lower-priced Linux operating system are referred to as the System p5 Express, OpenPower™ editions. In the case of Linux, only the first subscription purchased is lower priced. Therefore, for example, additional licenses purchased for Red Hat to run in multiple partitions are at full price. The lower-priced AIX 5L operating system is processed using a feature number on AIX 5L (AIX 5L Edition).

You can make changes to the standard features as needed and still qualify for processor entitlements at no additional charge and a lower-priced AIX 5L or Linux operating system license. However, a selection of total memory or DASD smaller than the total defined as the minimum disqualifies the order as an Express Edition product offering. Four Express Edition offerings are available for the IBM System p5 185 system, as shown in the following tables.

Table 1-8 Express Edition for the IBM System p5 185 system

Express Edition (FC 9576) with one processor activation	
Feature	**Description**
5324	1-core 2.5 GHz PowerPC 970 processor
4460	1 GB (2 x 512 MB) DIMMs
3579 x 2	73.4 GB 10k disk drive
5764	DVD-ROM
4252	IDE cable
7171	IBM rack-mount drawer bezel and hardware
5171	Power supply, 530 watt
4277	4-drop cable
6671	Power cord
8416	Zero-priced processor

Table 1-9 Express Edition for the IBM System p5 185 system

Express Edition (FC 9577) with one processor activation	
Feature	**Description**
5325	2-core 2.5 GHz PowerPC 970 processor
4460 x 2	1 GB (2 x 512 MB) DIMMs
3579 x 2	73.4 GB 10k disk drive
5764	DVD-ROM
4252	IDE cable
7171	IBM rack-mount drawer bezel and hardware
5172	Power supply, 750 watt
4277	4-drop cable
6671	Power cord
7312	One processor entitlement
8417	Zero-priced processor

Table 1-10 Express edition for the IBM System p5 185 system

Express edition (FC 9578) with one processor activation	
Feature	**Description**
5324	1-core 2.5 GHz PowerPC 970 processor
4460	1 GB (2 x 512 MB) DIMMs
3579 x 2	73.4 GB 10k disk drive
5764	DVD-ROM
4252	IDE cable
7167	IBM deskside cover set
5171	Power supply, 530 watt
4277	4-drop cable
6470	Power cord
8416	Zero prices processor entitlement

Table 1-11 Express Edition for the IBM System p5 185 system

Express Edition (FC 9579) with one processor activation	
Feature	**Description**
5325	2-core 2.5 GHz PowerPC 970 processor
4460 x 2	1 GB (2 x 512 MB) DIMMs
3579 x 2	73.4 GB 10k disk drive
5764	DVD-ROM
4252	IDE cable
7167	IBM deskside cover set
5172	Power supply, 750 watt
4277	4-drop cable
6470	Power cord
7312	One processor entitlement
8417	Zero-priced processor

1.6 System racks

The IBM 7014 Model S11, S25, T00, and T42 Racks are 19-inch racks for general use with IBM System p5, IBM @server® p5, pSeries, and OpenPower rack-mount servers. The racks provide increased capacity, greater flexibility, and improved floor space utilization.

If you are installing a System p5 server in a non-IBM rack or cabinet, you must ensure that the rack conforms to the EIA[1] standard EIA-310-D (see 1.6.9, “OEM rack” on page 14).

Note: It is the client’s responsibility to ensure that the installation of the drawer in the preferred rack or cabinet results in a configuration that is stable, serviceable, safe, and compatible with the drawer requirements for power, cooling, cable management, weight, and rail security.

[1] Electronic Industries Alliance (EIA). Accredited by American National Standards Institute (ANSI), EIA provides a forum for industry to develop standards and publications throughout the electronics and high-tech industries.

1.6.1 IBM 7014 Model T00 Rack

The 1.8-meter (71-inch) Model T00 is compatible with past and present IBM System p systems. It is a 19-inch rack and is designed for use in all situations that have previously used the earlier rack models R00 and S00. The T00 rack has the following features:

- 36 EIA units (36U) of usable space.
- Optional removable side panels.
- Optional highly perforated front door.
- Optional side-to-side mounting hardware for joining multiple racks.
- Standard business black or optional white color in OEM format.
- Increased power distribution and weight capacity.
- Optional reinforced (ruggedized) rack feature (FC 6080) provides added earthquake protection with modular rear brace, concrete floor bolt-down hardware, and bolt-in steel front filler panels.
- Support for both ac and dc configurations.
- The dc rack height is increased to 1926 mm (75.8 in.) if a power distribution panel is fixed to the top of the rack.
- Up to four power distribution units (PDUs) can be mounted in the PDU bays (see Figure 1-2 on page 12), but others can fit inside the rack. See 1.6.6, “The power distribution unit and rack content” on page 11.
- An optional rack status beacon (FC 4690). This beacon is designed to be placed on top of a rack and cabled to servers, such as a p5-520, and other components inside the rack. Servers can be programmed to illuminate the beacon in response to a detected problem or changes in system status.
- A rack status beacon junction box (FC 4693) should be used to connect multiple servers to the beacon. This feature provides six input connectors and one output connector for the rack. To connect the servers or other components to the junction box or the junction box to the rack, status beacon cables (FC 4691) are necessary. Multiple junction boxes can be linked together in a series using daisy chain cables (FC 4692).
- Weights:
  - T00 base empty rack: 244 kg (535 lb.)
  - T00 full rack: 816 kg (1795 lb.)

1.6.2 IBM 7014 Model T42 Rack

The 2.0-meter (79.3-inch) Model T42 addresses the client requirement for a tall enclosure to house the maximum amount of equipment in the smallest possible floor space. The features that differ in the Model T42 rack from the Model T00 include:

- 42 EIA units (42U) of usable space (6U of additional space).
- The Model T42 supports ac only.
- Weights:
  - T42 base empty rack: 261 kg (575 lb.)
  - T42 full rack: 930 kg (2045 lb.)

Optional Rear Door Heat eXchanger (FC 6858)

Improved cooling from the heat exchanger enables client to more densely populate individual racks freeing valuable floor space without the need to purchase additional air conditioning units. The Rear Door Heat eXchanger features:

- Water-cooled heat exchanger door designed to dissipate heat generated from the back of computer systems before it enters the room.
- An easy-to-mount rear door design that attaches to client-supplied water, using industry standard fittings and couplings.
- Up to 15 KW (approximately 50,000 BTUs per hour) of heat removed from air exiting the back of a fully populated rack.
- One year limited warranty

Physical specifications:

- Approximate height: 1,945.5 mm (76.6 in)
- Approximate width: 635.8 mm (25.03 in)
- Approximate depth: 141.0 mm (5.55 in)
- Approximate weight: 31.9 kg (70.0 lb.)

Client responsibilities:

- Secondary water loop (to building chilled water)
- Pump solution (for secondary loop)
- Delivery solution (hoses and piping)
- Connections: standard 3/4-inch internal threads

1.6.3 IBM 7014 Model S11 Rack

The Model S11 rack satisfies many light-duty requirements for organizing smaller rack-mount servers and expansion drawers. The 0.6-meter-high rack has a perforated, lockable front door; a heavy-duty caster set for easy mobility; a complete set of blank filler panels for a finished look; EIA unit markings on each corner to aid assembly; and a retractable stabilizer foot.

The Model S11 rack has the following specifications:

- Width: 520 mm (20.5 in.) with side panels
- Depth: 874 mm (34.4 in.) with front door
- Height: 612 mm (24.0 in.)
- Weight: 37 kg (75.0 lb.)

The S11 rack has a maximum load limit of 16.5 kg (36.3 lb.) per EIA unit for a maximum loaded rack weight of 216 kg (475 lb.).

1.6.4 IBM 7014 Model S25 Rack

The 1.3-meter-high Model S25 Rack satisfies many light-duty requirements for organizing smaller rack-mount servers. Front and rear rack doors include locks and keys, helping keep your servers secure. Side panels are a standard feature, which simplifies ordering and shipping. This 25U rack can be shipped configured and can accept server and expansion units up to 28 inches deep.

The front door is reversible so that it can be configured for either left or right opening. The rear door is split vertically in the middle and hinges on both the left and right sides.

The S25 rack has the following specifications:

- Width: 605 mm (23.8 in.) with side panels
- Depth: 1001 mm (39.4 in.) with front door
- Height: 1344 mm (49.0 in.)
- Weight: 100.2 kg (221.0 lb.)

The S25 rack has a maximum load limit of 22.7 kg (50 lb.) per EIA unit for a maximum loaded rack weight of 667 kg (1470 lb.).

1.6.5 S11 rack and S25 rack considerations

The S11 and S25 racks do not have vertical mounting space that accommodates feature number 7188 PDUs. All PDUs required for application in these racks must be installed horizontally in the rear of the rack. Each horizontally mounted PDU occupies 1U of space in the rack and, therefore, reduces the space available for mounting servers and other components.

FC 0469 Customer Specified Rack Placement provides the client the ability to specify the physical location of the system modules and attached expansion modules (drawers) in the racks. The client's input is collected and verified through the marketing configurator (eConfig). The client's request is reviewed by eConfig for safe handling by checking the weight distribution within the rack. The Manufacturing Plant provides the final approval for the configuration. This information is then used by IBM Manufacturing to assemble the system components (drawers) in the rack according to the client's request.

The CFReport from eConfig must be submitted to the following site:

`http://www.ibm.com/servers/eserver/power/csp`

Table 1-12 lists the machine types supported in the S11 and S25 racks.

Table 1-12 Models supported in S11 and S25 racks

Machine type-model	Name	Supported in	
		7014-S11 rack	7014-S25 rack
7037-A50	IBM System p5 185	Y	Y
7031-D24/T24	EXP4 Disk Enclosure	Y	Y
7311-D20	I/O Expansion Drawer	Y	Y
9110-510	IBM @server p5 510	Y	Y
9111-520	IBM @server p5 520	Y	Y
9113-550	IBM @server p5 550	Y	Y
9115-505	IBM System p5 505	Y	Y
9123-710	OpenPower 710	Y	Y
9124-720	OpenPower 720	Y	Y
9110-51A	IBM System p5 510 and 510Q	Y	Y
9131-52A	IBM System p5 520 and 520Q	Y	Y
9133-55A	IBM System p5 550 and 550Q	Y	Y
9116-561	IBM System p5 560Q	Y	Y

Machine type-model	Name	Supported in	
		7014-S11 rack	7014-S25 rack
9910-P33	3000VA UPS (2700 watt)	Y	Y
9910-P65	500VA UPS (208-240V)		Y
7315-CR3	Rack-mount HMC		Y
7310-CR3	Rack-mount HMC		Y
7026-P16	LAN attached async. RAN		Y
7316-TF3	Rack-mounted flat-panel console kit		Y

1.6.6 The power distribution unit and rack content

For rack models T00 and T42, 12-outlet PDUs (FC 9188 and FC 7188) are available. For rack models S11 and S25, FC 7188 is available.

Four PDUs can be mounted vertically in the T00 and T42 racks. See Figure 1-2 on page 12 for placement of the four vertically mounted PDUs. In the rear of the rack, two additional PDUs can be installed horizontally in the T00 rack and three in the T42 rack. The four vertical mounting locations will be filled first in the T00 and T42 racks. Mounting PDUs horizontally consumes 1U per PDU and reduces the space available for other racked components. When mounting PDUs horizontally, we recommend that you use fillers in the EIA units occupied by these PDUs to facilitate proper air-flow and ventilation in the rack.

The S11 and S25 racks support as many PDUs as there is available rack space.

For detailed power cord requirements and power cord feature codes, see the publication *IBM System p5, @server p5 and i5, and OpenPower Planning*, SA38-0508. For an online copy, select **Map of pSeries books to the information center** → **Planning** → **Printable PDFs** → **Planning** at the following Web site:

http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp?lang=en

Note: Ensure that the appropriate power cord feature is configured to support the power that is supplied.

The Base/Side Mount Universal PDU (FC 9188) and the optional, additional, Universal PDU (FC 7188) support a wide range of country requirements and electrical power specifications. The PDU receives power through a UTG0247 power line connector. Each PDU requires one PDU-to-wall power cord. Nine power cord features are available for different countries and applications by varying the PDU-to-wall power cord, which must be ordered separately. Each power cord provides the unique design characteristics for the specific power requirements. To match new power requirements and save previous investments, these power cords can be requested with an initial order of the rack or with a later upgrade of the rack features.

The PDU has 12 client-usable IEC 320-C13 outlets. There are six groups of two outlets that are fed by six circuit breakers. Each outlet is rated up to 10 amps, but each group of two outlets is fed from one 15 amp circuit breaker.

Note: Based on the power cord that is used, the PDU can supply from 4.8 kVA to 19.2 kVA. The total kilovolt ampere (kVA) of all the drawers that are plugged into the PDU must not exceed the power cord limitation.

The Universal PDUs are compatible with previous models.

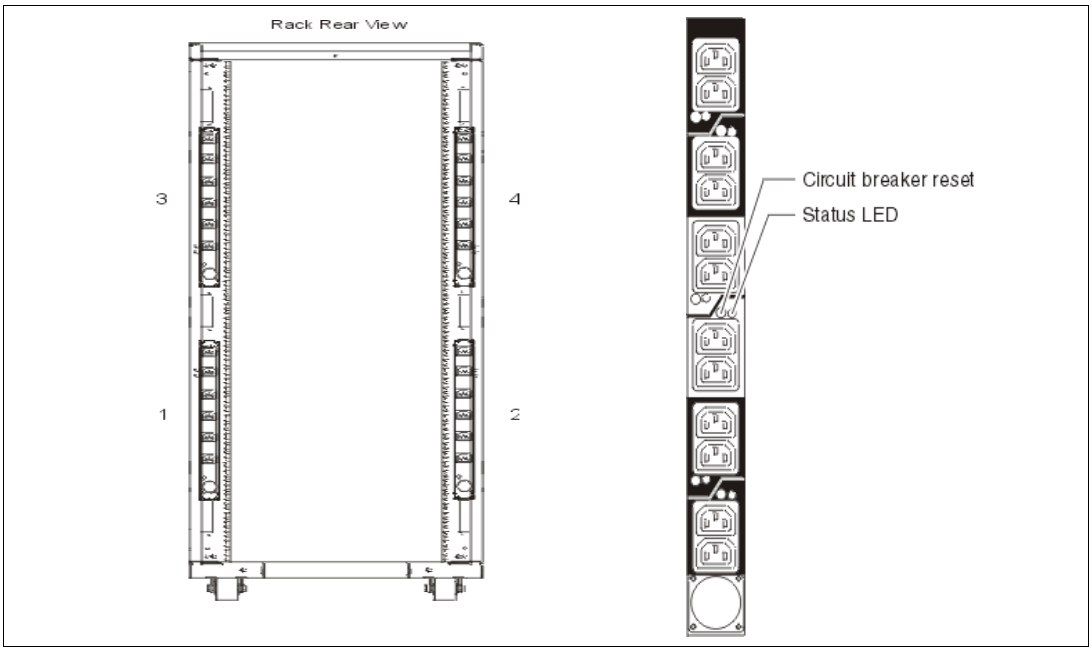

Figure 1-2 PDU placement and PDU view

1.6.7 Rack-mounting rules for p5-185

The primary rules that should be followed when mounting the p5-185 into a rack are:

- The p5-185 is designed to be placed at any location in the rack. For rack stability, it is advisable to start filling a rack from the bottom.
- Any remaining space in the rack can be used to install other systems or peripherals, provided that the maximum permissible weight of the rack is not exceeded and the installation rules for these devices are followed.
- Before placing a p5-185 into the service position, it is essential that the rack manufacturer's safety instructions have been followed regarding rack stability.

Depending on the current implementation and future enhancements, Table 1-13 shows examples of the minimum and maximum configurations for p5-185 systems.

Table 1-13 Minimum and maximum configurations for p5-185 systems

Rack	Number of p5-185 systems
7014-T00 rack	7
7014-T42 rack	8
7014-S11 rack	2
7014-S25 rack	5

1.6.8 Additional options for rack

This section highlights a solution available to provide a single point of management for environments composed of multiple IBM System p5 185 servers or other IBM System p systems.

Flat panel display options

The IBM 7316-TF3 Flat Panel Console Kit can be installed in the system rack. This 1U console uses a 15-inch thin film transistor (TFT) LCD with a viewable area of 304.1 mm x 228.1 mm and a 1024 x 768 pels[2] resolution. The 7316-TF3 Flat Panel Console Kit has the following attributes:

- Flat panel color monitor.
- Rack tray for keyboard, monitor, and optional VGA switch with mounting brackets.
- IBM Travel Keyboard mounts in the rack keyboard tray (Integrated Trackpoint and UltraNav).

IBM PS/2 Travel Keyboards are supported on the 7316-TF3 for use in configurations where only PS/2 keyboard ports are available.

The IBM 7316-TF3 Flat Panel Console Kit provides an option for the USB Travel Keyboards with UltraNav. The keyboard enables the 7316-TF3 to be connected to systems that do not have PS/2 keyboard ports. The USB Travel Keyboard can be directly attached to an available integrated USB port or a supported USB adapter (2738) on System p5 servers or 7310-CR3 and 7315-CR3 HMCs.

The Netbay LCM (Keyboard/Video/Mouse) Switch (FC 4202) provides users single-point access and control of up to 64 servers from a single console. The Netbay LCM Switch has a maximum video resolution of 1600x 280 and mounts in a 1U drawer behind the 7316-TF3 monitor. A minimum of one LCM feature (FC 4268) or USB feature (FC 4269) is required with a Netbay LCM Switch (FC 4202). Each feature can support up to four systems. When connecting to a p5-520, FC 4269 provides connection to the POWER5™ USB ports. Only the PS/2 keyboard is supported when attaching the 7316-TF3 to the LCM Switch.

When selecting the LCM Switch, consider the following information:

- The KVM Conversion Option (KCO) cable (FC 4268) is used with systems with PS/2 style keyboard, display, and mouse ports.
- The USB cable (FC 4269) is used with systems with USB keyboard or mouse ports.
- The switch offers four ports for server connections. Each port in the switch can connect a maximum of 16 systems:
  - One KCO cable (FC 4268) or USB cable (FC 4269) is required for every four systems supported on the switch.
  - A maximum of 16 KCO cables or USB cables per port can be used with the Netbay LCM Switch to connect up to 64 servers.

[2] Picture elements

Note: A server microcode update might be required on installed systems for boot-time System Management Services (SMS) menu support of the USB keyboards. The update might also be required for the LCM switch on the 7316-TF3 console (FC 4202). For microcode updates, see the following URL:

`http://techsupport.services.ibm.com/server/mdownload`

We recommend that you have the 7316-TF3 installed between EIA 20 to 25 of the rack for ease of use. The 7316-TF3 or any other graphics monitor requires a POWER GXT135P graphics accelerator (FC 2849) to be installed in the server, or some other graphics accelerator, if supported.

1.6.9 OEM rack

The p5-185 can be installed in a suitable OEM rack, provided that the rack conforms to the EIA-310-D standard for 19-inch racks. This standard is published by the Electrical Industries Alliance, and a summary of this standard is available in the publication *IBM System p5, IBM @server p5 and i5, and OpenPower Planning*, SA38-0508.

The key points mentioned in this documentation are as follows:

- The front rack opening must be 451 mm wide + 0.75 mm (17.75 in. + 0.03 in.), and the rail-mounting holes must be 465 mm + 0.8 mm (18.3 in. + 0.03 in.) apart on center (horizontal width between the vertical columns of holes on the two front-mounting flanges and on the two rear-mounting flanges). See Figure 1-3 for a top view showing the specification dimensions.

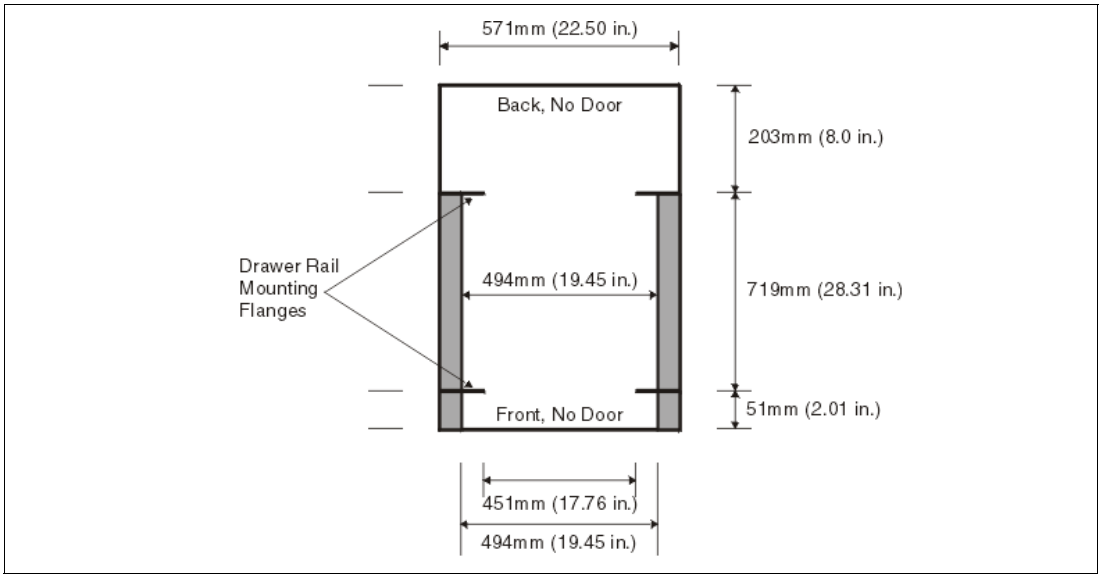

Figure 1-3 Top view of non-IBM rack specification dimensions

- The vertical distance between the mounting holes must consist of sets of three holes spaced (from bottom to top) 15.9 mm (0.625 in.), 15.9 mm (0.625 in.), and 12.67 mm (0.5 in.) on center, making each three-hole set of vertical hole spacing 44.45 mm (1.75 in.) apart on center. Rail-mounting holes must be 7.1 mm (0.28 in.) + 0.1 mm (0.004 in.) in diameter. See Figure 1-4 and Figure 1-5 for the top and bottom front specification dimensions.

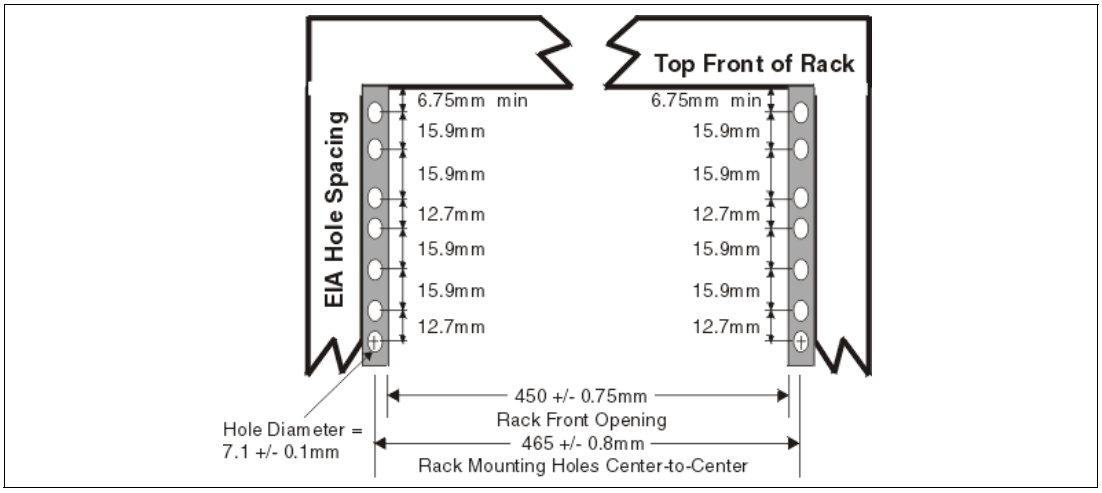

Figure 1-4 Rack specification dimensions, top front view

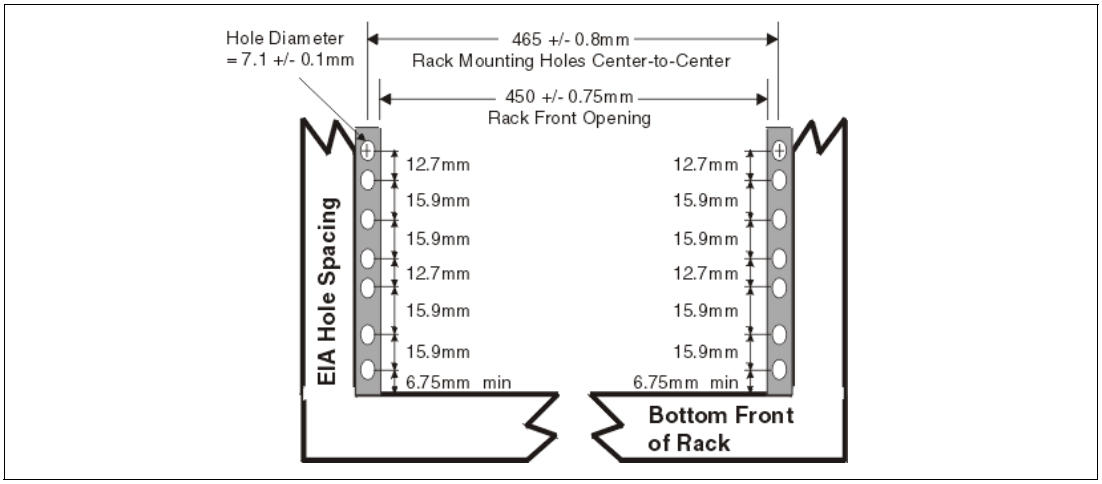

Figure 1-5 Rack specification dimensions, bottom front view

- It might be necessary to supply additional hardware, such as fasteners, for use in some manufacturer's racks.
- The system rack or cabinet must be capable of supporting an average load of 15.9 kg (35 lb.) of product weight per EIA unit.
- The system rack or cabinet must be compatible with drawer mounting rails, including a secure and snug fit of the rail-mounting pins and screws into the rack or cabinet rail support hole.

Note: The OEM rack must only support ac-powered drawers. We strongly recommend that you use a power distribution unit (PDU) that meets the same specifications as the PDUs to supply rack power. Rack or cabinet power distribution devices must meet the drawer power requirements, as well as the requirements of any additional products that are connected to the same power distribution device.

2

Architecture and technical overview

This chapter discusses the overall system architecture represented by Figure 2-1. We describe the major components of this diagram in the following sections. The bandwidths provided throughout this section are theoretical maximums provided for reference. We recommend that you use production workloads to obtain real-world performance measurements.

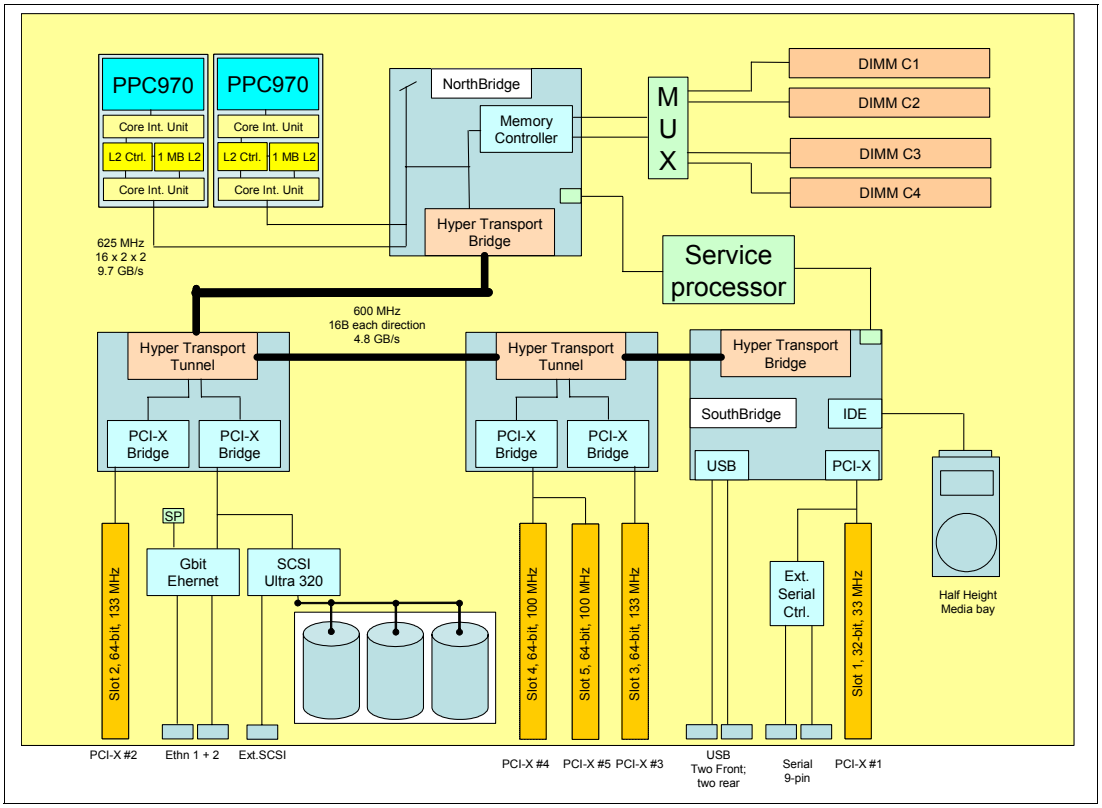

Figure 2-1 IBM System p5 185 logical architecture

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2.1 The PowerPC 970 processor

The IBM PowerPC 970, reduced instruction set cycle (RISC) processor, is an implementation of technology that is based on the existing IBM POWER processor development. The PPC 970 processor is a single chip and dual-core, 64-bit PowerPC processor, with one active core, operating at a 2.5 GHz clock frequency and a 1 MB L2 cache on-chip per processor, with a vector processing unit named AltiVec that is described in 2.1.2, “AltiVec enhancement” on page 19.

To fulfill a system design that lowers the acoustics, reduces the internal temperature, and provides additional cache, the PowerPC 970 chip is delivered with one active core. A 2-way IBM System p5 185 system consists of two PowerPC 970 chips, that are soldered directly to the system planar using a 575-pin ceramic ball grid array (CBGA) package.

In 1991, IBM teamed with Apple Computer and Motorola to define the PowerPC Architecture™. The goals of this new architecture were to:

- Permit a broad range of implementations, from low-cost controllers to high-performance processors
- Be sufficiently simple to permit the design of processors that have a very short cycle time
- Minimize the effects that hinder the design of aggressive superscalar implementations.
- Include multiprocessor features.
- Define a 64-bit architecture that is a super-set of the 32-bit POWER architecture, providing application binary compatibility for 32-bit applications

While based on the POWER architecture, the PowerPC Architecture incorporated several modifications to enable it to be more widely applied in a variety of application scenarios. This vision has been subsequently realized with processors implementing PowerPC Architecture now having been installed in desktop, server, and embedded systems across commercial, consumer, industrial, and scientific settings.

To achieve the design goals for the PowerPC Architecture, some features of the original POWER architecture were removed. These were mostly features that were infrequently used. The PowerPC Architecture defines both 32-bit and 64-bit modes of operation. The primary differences in these two modes of operation are in the effective length of addresses used by the processor, and the availability of extra capabilities to manipulate double word (64-bit) fixed-point operands in 64-bit mode. Floating-point capabilities are the same in both 32-bit and 64-bit modes. The 32-bit PowerPC Architecture implementations only support the 32-bit mode of operation. The 64-bit PowerPC Architecture implementations support both the 32-bit and 64-bit modes of operation. This design enables the 64-bit PowerPC Architecture implementations to support the full-speed execution of existing 32-bit applications, alongside 64-bit applications, in the same operating environment.

2.1.1 CMOS, copper, and SOI technology

The PPC 970 processor design is a result of a close collaboration between IBM Systems Group and IBM Microelectronics technologies that enables IBM System p5 systems to give clients improved performance, and reduced power consumption. The PPC 970 processor chip takes advantage of IBM leadership technology. It is made using IBM 90 µm-lithography complementary metal-oxide semiconductor (CMOS) technology. The PPC 970 processor also uses silicon-on-insulator (SOI) technology designed to allow a higher operating frequency for improved performance yet with reduced power consumption and improved reliability compared to processors not using this technology.

2.1.2 AltiVec enhancement

IBM Semiconductor's advanced AltiVec technology is designed to enable exceptional general-purpose processing power for high-performance PowerPC processors. This leading-edge technology is engineered to support high-bandwidth data processing and algorithmic-intensive computations, all in a single-chip solution.

With its computing power, AltiVec technology also enables high-performance PowerPC processors to address markets and applications in which performance must be balanced with power consumption, system cost and peripheral integration.

The AltiVec technology is a well known environment for software developers who want to add efficiency and speed to their applications. A 128-bit vector execution unit was added to the architecture. This engine operates concurrently with the existing integer and floating-point units and enables highly parallel operations — up to 16 operations in a single clock cycle. By leveraging AltiVec technology, developers can see dramatic acceleration in performance-driven, high-bandwidth computing.

The AltiVec technology is not comparable to the IBM POWER5 processor implementation, using the simultaneous multithreading functionality.

Vector technology review

Vector technology expands the PowerPC architecture through the addition of a 128-bit vector execution unit, which operates concurrently with the existing integer- and floating-point units. This new engine provides for highly parallel operations, allowing for the simultaneous execution of up to four 32-bit floating operations or sixteen 8-bit fixed-point operations in one instruction. All VPU (Visual Processing Unit) datapaths and execution units are 128 bits wide and are fully pipelined.

This technology can be thought of as a set of registers and execution units that can be added to the PowerPC architecture in a manner analogous to the addition of floating-point units. Floating-point units were added to provide support for high-precision scientific calculations and the vector technology is added to the PowerPC architecture to accelerate the next level of performance-driven, high-bandwidth communications and computing applications.

The basic concept behind vector processing is to enhance the performance of data-intensive applications by providing hardware support for operations that can manipulate an entire vector (or array) of data in a single operation.

Scalar processors perform operations that manipulate single data elements such as fixed-point or floating-point numbers. For example, scalar processors usually have an instruction that adds two integers to produce a single-integer result.

Vector processors perform operations on multiple data elements arranged in groups called vectors (or arrays). In Figure 2-2 on page 20, a vector add operation adds two vectors performs a pairwise addition of each element of one source vector with the corresponding element of the other source vector. It places the result in the corresponding element of the destination vector. Typically, a single vector operation on vectors of length n is equivalent to performing n scalar operations.

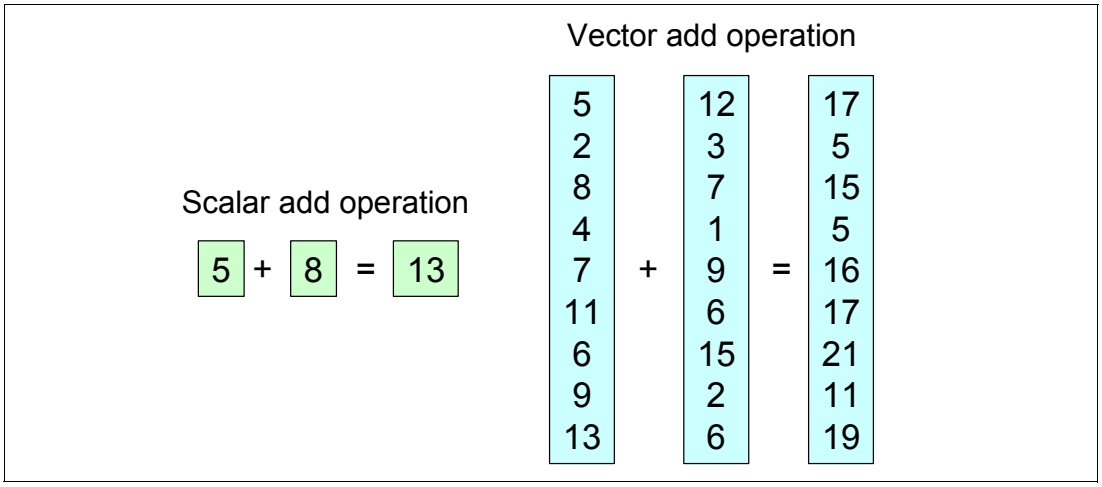

Figure 2-2 Scalar and vector operation

Processor designers are continually looking for ways to improve application performance. The addition of vector operations to a processor architecture is one method that a processor designer can use to make it easier to improve the peak performance of a processor. However, the actual performance improvements that can be obtained for a specific application depend on how well the application can exploit vector operations.

2.1.3 Available processor speeds

The IBM System p5 185 operates only at a processor clock rate of 2.5 GHz for 1-core and 2-core systems. To determine the processor characteristics on a running system, use one of the following AIX 5L commands:

- **`lsattr -El proc`*`X`***

  Where *X* is the number of the processors. For example, proc0 is the first processor in the system. The output from the command would be similar to that shown in Example 2-1. (`False`, as used in this output, signifies that the value cannot be changed through an AIX 5L command interface.)

  Example 2-1 Using the lsattr command to determine processor characteristics

```
type PowerPC_970MP    Processor type False
frequency 2519967993  Processor Speed False
smt_enabled true      Processor SMT enabled False
smt_threads 1         Processor SMT threads False
state enable          Processor state False
```

- **`pmcycles -m`**

  This command uses the performance monitor cycle counter and the processor real-time clock to measure the actual processor clock speed in MHz. The following output is from a 1-core p5-185 system running at 2.5 GHz:

```
This machine runs at 2520 MHz
```

Note: The **`pmcycles`** command is part of the bos.pmapi fileset. First check whether that component is installed using the **`lslpp -l bos.pmapi`** command.

2.1.4 System bus

HyperTransport technology (HT) is a high-speed, low latency, point-to-point link that is designed to increase the communication speed between integrated circuits in computers, servers, embedded systems, and networking and telecommunications equipment up to 48 times faster than some existing technologies.

HyperTransport technology helps reduce the number of buses in a system, which can reduce system bottlenecks and enable today's faster microprocessors to use system memory more efficiently as provided as a functional overview in Figure 2-3.

HyperTransport technology is used to connect the NorthBridge chip to the integrated PCI-X I/O bridge chips, along to the SouthBridge chip. HyperTransport technology provides a high-speed, high-performance, point-to-point link for interconnecting integrated circuits on a board, with a top signaling of 1.6 GBps on each wire pair.

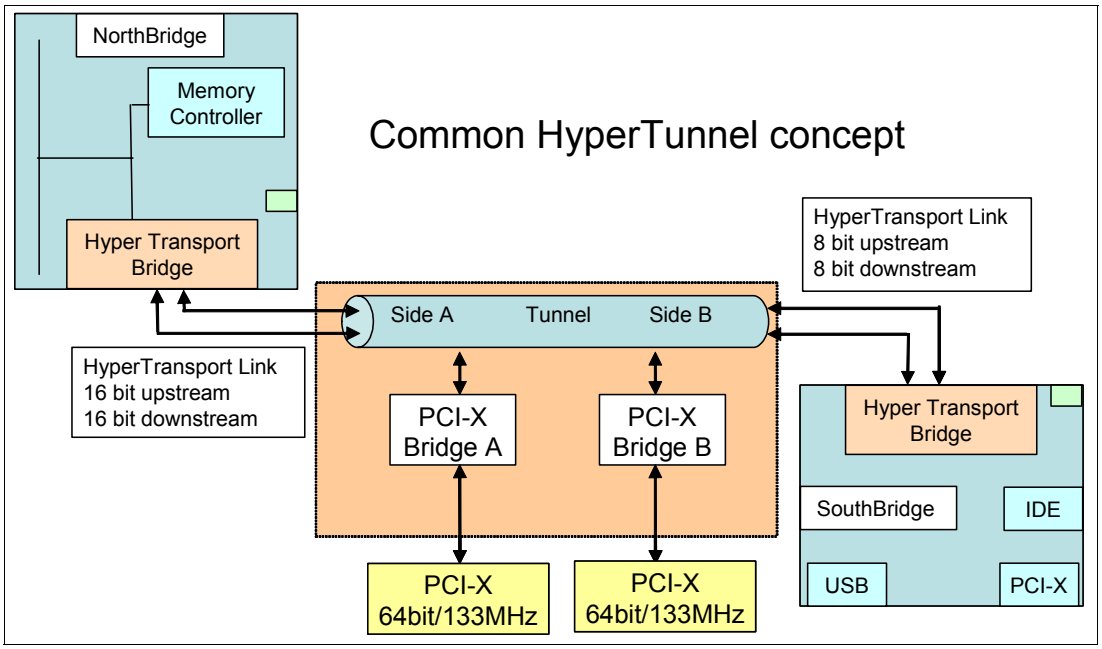

Figure 2-3 Basic concept of HyperTunnel implementation

2.2 Memory subsystem

The IBM System p5 185 system offers pluggable DIMMs for memory. The minimum memory for a 1-core or 2-core processor system is 512 MB and 8 GB as the maximum installable memory option. Table 1-6 on page 5 shows the offerings and memory slots that are available.

2.2.1 Memory placement rules

Figure 2-4 lists the memory features available at the time of writing for the IBM System p5 185 system. Memory must be plugged in pairs, as required by the feature codes. Memory is installed in the following order. The first pair is installed in C1 and C4; the second pair is installed in C2 and C3. The service information label, located on the top cover of the system, provides memory DIMMs slot location information. Figure 2-4 illustrates the memory placement rules.

Note: A pair must consist of a single feature (that is made of identical DIMMs). Mixed DIMM capacities in a pair will result in reduced RAS.

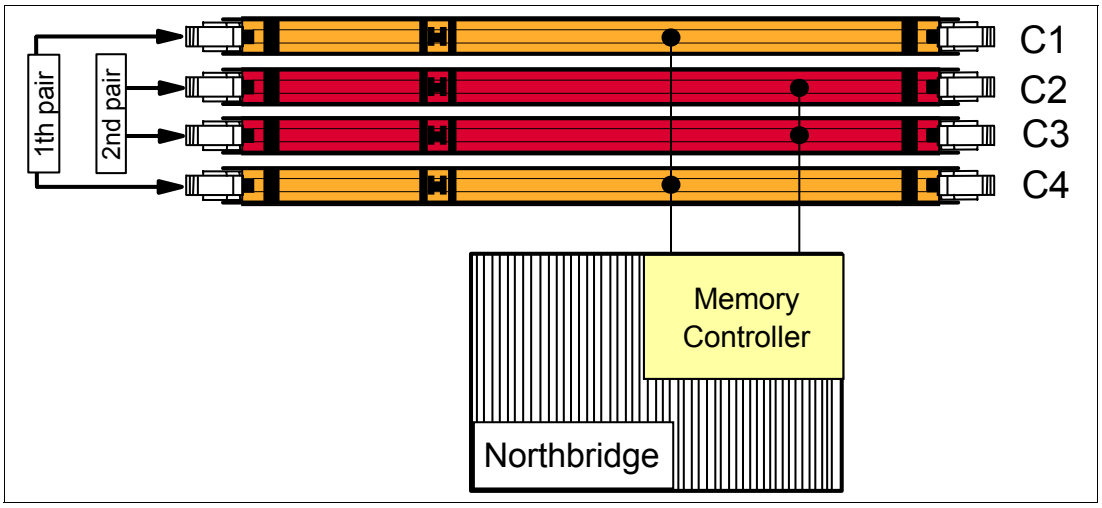

Figure 2-4 Memory placement rules for the IBM Server p5-185

2.2.2 Memory restrictions

The IBM Server p5-185 system does not support OEM memory, and there is no exception to this rule. OEM memory is never certified for the use in IBM @server pSeries and the new IBM System p5 systems. If the IBM System p5 185 system is populated with OEM memory, you might experience unexpected and unpredictable behavior.

All IBM memory is identified by an IBM logo and a white label that is printed with a barcode on the top and an alphanumeric string on the bottom, which is created according to the rule that is reported in Figure 2-5.

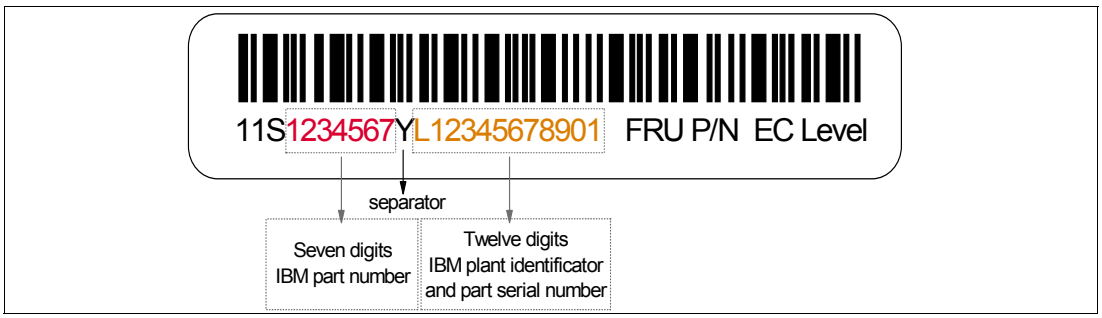

Figure 2-5 IBM memory certification label

Sometimes, OEM vendors put a label that reports the IBM memory part number but not the barcode or the alphanumeric string, or both, on their DIMMs.

In case of system failure that is caused by OEM memory installed in the system, the first thing to do is to replace the suspected memory with IBM memory and check whether the problem is corrected. Then, you should contact your IBM representative for further assistance if needed.

2.2.3 Memory throughput

The IBM Server p5-185 system supports four physical DDR1 slots and memory DIMMs in sizes from 256 MB up to 2 GB. Each PPC 970 processor is interfaced with two unidirectional buses, running at 625 MHz and a total of 9.7 GBps throughput, to the NorthBridge subsystem, with the integrated memory controller.

The integrated NorthBridge memory controller is interfaced to the four available memory slots, using a 72-bit (64-bit data plus 8-bit for ECC) wide interconnection.

The DIMMs are DDR1 operating at 333 MHz through four 8-byte paths. Read and write operations share these paths. There must be at least four DIMMs installed to effectively use each path. In this case, the throughput between the NorthBridge and the DIMMs is (8 x 4 x 333 MHz) or 5.2 GBps.

These values are maximum theoretical throughputs for comparison purposes only.

2.3 Internal I/O subsystem

The internal I/O subsystem and the Service Processor resides on the system planar. The system planar contains the NorthBridge chip, HT Tunnel PCI-X bridge chips, and the SouthBridge chip to connect the integrated I/O packaged on the system planar.

The system planar provides five non-hot-pluggable PCI slots and several integrated PCI devices that interface the two HT Tunnel PCI-X bridges to the slots and devices.

Slot 1 will accept short adapters only. The remaining Slots 2 through 5 accept short as well as long adapters.

2.3.1 PCI-X and PCI slots, and adapters

PCI-X, where the X stands for extended, is an enhanced PCI bus, delivering a bandwidth of up to 1 GBps, running a 64-bit bus at 133 MHz. PCI-X is backward compatible, so the IBM Server p5-185 system can support existing 3.3 volt PCI adapters.

The slots have the following attributes:

- Two 133 MHz 64-bit PCI-X slots, full length and full height
- Two 100 MHz 64-bit PCI-X slots, full length and full height
- One 33 MHz 32-bit PCI slot, half length and full height

Note: Adapter in Slot 5 can operate at 133 MHz if slot 4 is empty. Otherwise, slot 5 operates at 100 MHz if slot 4 is occupied. Slot 4, operates at 100 Mhz only.

64-bit and 32-bit adapters

IBM offers 64-bit adapter options for the IBM Server p5-185 system, as well as 32-bit adapters. Higher-speed adapters use 64-bit slots because they can transfer 64 bits of data for each data transfer phase. Generally, 32-bit adapters can function in 64-bit PCI-X slots. However, some 64-bit adapters cannot be used in 32-bit slots. For a full list of the adapters that are supported on the p5-185 system and for important information regarding adapter placement, see the IBM System Hardware Information Center.

2.3.2 LAN adapters

When an IBM Server p5-185 system is connected to a local area network (LAN), the internal dual port 10/100/1000 Mbps RJ-45 Ethernet controller, integrated on the system planar, can be used.

Table 2-1 lists additional LAN adapters that are available at the time of writing. IBM supports an installation with Network Installation Management (NIM) using Ethernet adapters (CHRP[1] is the platform type).

Table 2-1 Available LAN adapters

Feature	Description	Slot	Size	Max
1978	IBM Gigabit Ethernet-SX PCI-X Adapter	64	Short	4
1979	IBM 10/100/1000 Base-TX Ethernet PCI-X Adapter	64	Short	4
1983	IBM 2-Port 10/100/1000 Base-TX Ethernet PCI-X Adapter	64	Short	4
1984	IBM 2-Port Gigabit Ethernet-SX PCI-X Adapter	64	Short	4
1954	IBM 4-Port 10/100/1000 Base-TX PCI-X Adapter	64	Short	2

2.3.3 iSCSI adapters

The System p5 185 provides end-to-end iSCSI support when using the new System p5 iSCSI HBAs to create a low-cost storage area network in conjunction with System Storage™ N3000 line. New iSCSI adapters in IBM System p5 systems provide advantage of the increased bandwidth to the System Storage N series as the first of a whole new generation of iSCSI enabled storage products.

The 1 Gigabit iSCSI TOE PCI-X adapters support hardware encapsulation of SCSI commands and data into TCP and transports over the Ethernet via IP packets. The adapter operates as an iSCSI TOE (TCP/IP Offload Engine). This offload function eliminates host protocol processing and reduces CPU interrupts. Adapter uses Small form factor LC type fiber optic connector or copper RJ45 connector. Table 2-2 shows the orderable iSCSI adapters.

Table 2-2 Available iSCSI adapters

Feature	Description	Slot	Size	Max
1986	1 Gigabit iSCSI TOE PCI-X on Copper Media Adapter	64	Short	3
1987	1 Gigabit iSCSI TOE PCI-X on Optical Media Adapter	64	Short	3

[1] CHRP stands for *Common Hardware Reference Platform*, a specification for IBM PowerPC-based systems that can run multiple operating systems.

2.3.4 Graphics accelerators

This section provides additional information that is related to graphics accelerators that are available for the IBM Server p5-185.

Note: When using Linux on the IntelliStation POWER 185, the only supported graphic accelerator is the GXT135P.

GXT135P

The POWER GXT135P is a low-priced 2D graphics accelerator for workstations and servers. The IBM System p5 185 system supports up to four enhanced POWER GXT135P (FC 1980) 2D graphics accelerators. It can be configured to operate in either 8-bit or 24-bit color modes, running at 60 Hz to 85 Hz. This adapter supports both analog and digital monitors. The adapter requires one short 32-bit or 64-bit PCI-X slot. Figure 2-6 on page 26 show the adapter card, which has the following features and specifications:

- Hardware description:
  - 128-bit graphics processor
  - 8-bit color lookup table or 24-bit true color
  - 16 MB SDRAM
  - 32-bit PCI interface
  - Universal PCI (5.0v or 3.3v)
  - 1 hardware color map
- Features supported:
  - Up to approximately 16.7 million colors
  - Rectangular clipping
  - Two analog monitor outputs at up to 1280 x 1024 resolution
  - One analog monitor output at up to 2048 x 1536 resolution
  - One digital monitor output at up to 1600 x 1200 resolution
  - 60 to 85 Hz refresh rates (ISO 9241, Part 3)
- APIs supported:
  - X Windows® System
  - Motif
- Software supported:
  - IBM AIX 5L Version 5.2, or later
  - SUSE Linux Enterprise Server 9, or later
  - Red Hat Enterprise Linux AS 4, or later

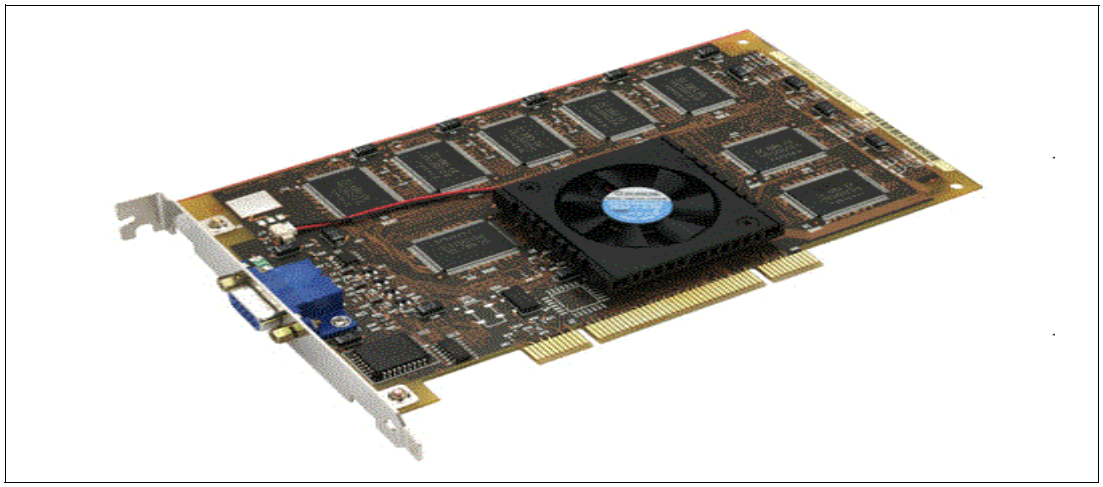

Figure 2-6 The GXT135P graphics accelerator

2.3.5 Flat panel monitors

The p5-185 deskside server, combined with a graphics accelerator, can be equipped with an efficient and powerful monitor. The following sections describe the four Flat Panel Monitors that are supported on a p5-185 server using the GXT135P graphic accelerators.

T115 Flat Panel Monitor (FC 3641)

The IBM T115 LCD flat-panel monitor has the following general characteristics:

- 15.0-inch LCD digital screen with a viewable image size of 381 mm (15.0 in.)
- Maximum resolution of 1024 x 768 (XGA)
- Video inputs: 15-pin D
- Brightness: 250cd/m2 (typical)
- Contrast ratio: 400:1 (typical)
- Depth (w/stand): 144 mm (6.67 in.)
- Height (max w/stand): 361 mm (14.2 in.)
- Width: 362 mm (14.2 in.)
- Weight: 2.9 kg (6.4 lb.)

T117 Flat Panel Monitor (FC 3645)

The IBM T117 LCD flat-panel monitor has the following general characteristics:

- 17.0-inch LCD digital screen with a viewable image size of 432 mm (17.0 in.)
- Maximum resolution of 1280 x 1024 (SXGA)
- Video inputs: 15-pin D / DVI-D
- Brightness: 300cd/m2 (typical
- Contrast ratio: 500:1 (typical)
- Depth (w/stand): 246 mm (9.7 in.)
- Height (max w/stand): 395.5 mm (15.6 in.)
- Width: 375.4 mm (14.8 in.)
- Weight: 5.8 kg (12.8 lb.)

T119 Flat Panel Monitor (FC 3644)

The IBM T119 LCD flat-panel monitor has the following general characteristics:

- 19.0-inch LCD digital screen with a viewable image size of 483 mm (19.0 in.)
- Maximum resolution of 1280 x 1024 (SXGA)
- Video inputs: 15-pin D / DVI-D
- Brightness: 250cd/m2 (typical)
- Contrast ratio: 550:1 (typical)
- Depth (w/stand): 246 mm (9.7 in.)
- Height (max w/stand): 443.6 mm (17.5 in.)
- Width: 418 mm (16.5 in.)
- Weight: 7.4 kg (16.3 lb.)

T120 Flat Panel Monitor (FC 3643)

The IBM T120 LCD flat-panel monitor has the following general characteristics:

- 20.1-inch LCD digital screen with a viewable image size of 511 mm (20.1 in.)
- Maximum resolution of 1600 x 1200 (UXGA)
- Video inputs: 15-pin D / DVI-D
- Brightness: 300cd/m2 (typical)
- Contrast ratio: 700:1 (typical)
- Depth (w/stand): 246 mm (9.7 in.)
- Height (max w/stand): 416.6 mm (16.5 in.)
- Width: 445.6 mm (17.5 in.)
- Weight: 7.5 kg (16.5 lb.)

2.3.6 Audio adapter

The IBM Server p5-185 system supports a PCI audio adapter (FC 8244). It is a 3.3 volt, 32-bit PCI adapter that runs at 33 MHz and requires one short 32-bit or 64-bit PCI-X slot. The adapter provides external jacks for headphones, speaker output, line input, microphone input, and an internal connector for CD or DVD drive audio input (Figure 2-7).

Note: This adapter is not orderable with the POWER 185. However, it is supported if the client has an existing adapter to migrate from an existing workstation.

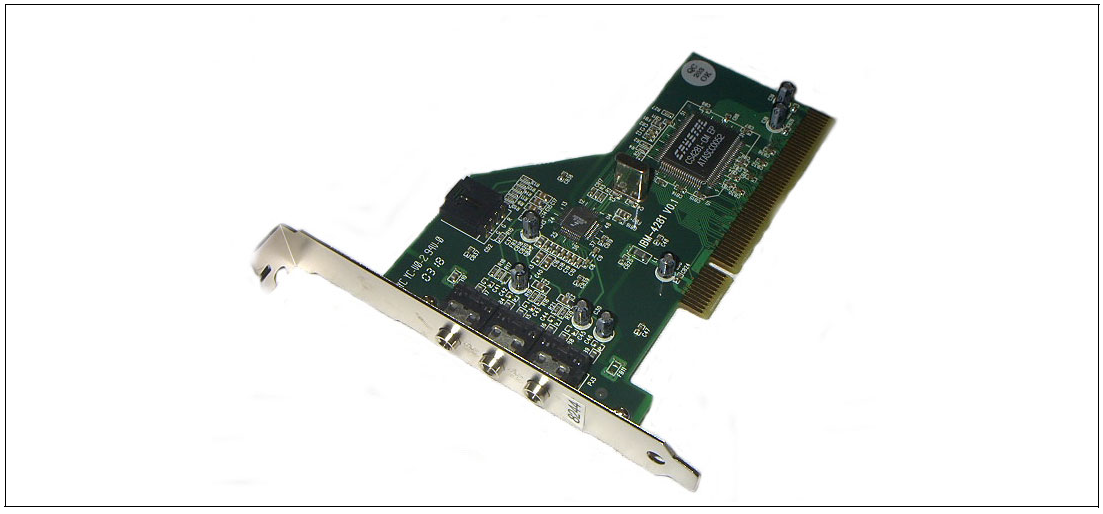

Figure 2-7 PCI audio adapter

2.3.7 SCSI adapters

To connect to additional external SCSI devices, the orderable adapters that are provided in Table 2-3 are available, at the time of writing, to be used in the IBM Server p5-185 system.

Table 2-3 Orderable SCSI adapters

Feature	Description	Slot	Size	Max
1912	PCI-X DDR Dual Channel Ultra320 LVD SCSI Adapter	64	Short	4
1913	PCI-X DDR Dual Channel Ultra320 LVD SCSI RAID Adapter	64	Short	4

Note: The p5-185 server provides one external SCSI port with an associated connector on the rear side of the system. No additional PCI-X slot is required.

2.3.8 Fibre Channel adapter

The p5-185 supports up to three 2 Gigabit Fibre Channel PCI-X adapters (FC 1977). The PCI-X adapter is a 64-bit, short form factor adapter with an LC type external fibre connector that provides single or dual initiator capability over an optical fiber link or loop. With the use of appropriate optical fiber cabling, this adapter provides the capability for a network of high speed local and remote located storage. Distances of up to 500 meters running at 1 Gbps data rate and up to 300 meters running at 2 Gbps data rate are supported between the adapter and an attaching device or switch. When used with IBM supported Fibre Channel storage switches supporting long-wave optics, distances of up to 10 kilometers are capable running at either 1 Gbps or 2 Gbps data rates.

The 2 Gigabit Fibre Channel PCI-X Adapter can be used to attach devices either directly, or using the supported Fibre Channel Switches. If attaching a device or switch with an SC type fibre connector, also the LC-SC 50 Micron Fiber Converter Cable (FC 2456) or a LC-SC 62.5 Micron Fiber Converter Cable (FC 2459) is required.

2.3.9 Additional support for owned PCI-X adapters

The lists of the major PCI-X adapters that can be configured in an IBM Server p5-185 when an initial configuration order is built are described in the previous sections. However, the list of all the supported PCI-X adapters, with the related support for additional external devices, is more extended.

Clients that would like to use owned PCI-X adapters can contact the IBM service representative to verify if they are supported.

2.4 Peripheral ports

The IBM System p5 185 supports two native serial ports, four USB ports to connect peripheral devices, a SCSI port, and two Ethernet ports.

2.4.1 Serial ports

The serial ports on this system are full-function serial ports that can be used for TTY, modem, and other functions for the same applications as the adapters that listed in Table 2-4. None of the restrictions of the system ports from POWER5 and POWER5+ processor-based systems apply.

The serial ports S1 and S2 at the rear of the system are always available if the system is up and running. To provide additional serial ports to a system, select from the list of features shown in Table 2-4.

Table 2-4 Orderable serial adapters

Feature	Description	Slot	Size	Max
5723	2-port Asynchronous IEA-232 Adapter	64	short	2
2943	8-port Asynchronous IEA-232/RS-422 Adapter	64	short	2

2.4.2 USB ports

To provide an alternative method to connect peripheral devices to the system, four unique USB ports are provided on the p5-185 system. The current USB implementation supports two USB ports at the front and two USB ports at the rear side of the system using the USB 1.1 standard protocol. The front and rear USB ports can be used at the same time.

2.4.3 SCSI port

A SCSI port is provided for SCSI attached external storage.

2.4.4 Ethernet ports

The two built-in Ethernet ports provide 10/100/1000 Mbps connectivity over CAT-5 cable for up to 100 meters.

The LEDs that are visible on the side of the jack have the attributes that are provided in Table 2-5.

Table 2-5 Ethernet LED descriptions

LED	Light	Description
Link speed	Off Green Orange	10 Mbps 100 Mbps 1000 Mbps
Link	Green Off Blinking	Working link No link; could indicate a bad cable, not selected, or configuration error. Data activity

2.5 Internal storage

There is one dual channel Ultra320 SCSI controller integrated into the system planar. One port is an external port used to attach external devices as described in 2.4.3, “SCSI port” on page 29. The other port is used to drive the internal disk drives. Up to three internal drives are installable in a disk drive mounting cage.

2.5.1 Internal media devices

The IBM System p5 185 system provides a half-height media bay for an optional DVD-ROM or an optional DVD-RAM and one media bay for a tape drive, as listed in Table 2-6 and Table 2-7, or an additional disk drive, as listed in table Table 2-9.

Table 2-6 Available DVD devices

Feature	Description	Media bay
5763	IDE DVD-RAM Drive, Half-High	1
5764	IDE DVD-ROM Drive, Half-High	1

Table 2-7 Available tape devices

Feature	Description	Media bay
1892	VXA-320 160/320 GB Internal Tape Drive	1
1991	IBM 36/72 GB 4 mm Internal Tape Drive	1
1992	IBM 80/160 GB Internal Tape Drive with VXA Technology	1
1997	IBM 200/400 GB half height Ultrium 2 Tape Drive	1

2.5.2 Internal SCSI disks

The IBM System p5 185 system can have up to three disk drives installed in the internal disk drive cage. See Table 2-8 for the available disk drive capacities.

Table 2-8 Disk drive options

Feature code	Description
3579	73.4 GB 10K RPM Ultra320 SCSI Disk Drive, Bolt-in
3580	146.8 GB 10K RPM Ultra320 SCSI Disk Drive, Bolt-in
3581	300 GB 10K RPM Ultra320 SCSI Disk Drive, Bold-in

Additional a fourth internal 3.5-inch disk can be installed in the second slot of the 5.25-inch media bay. This feature, see Table 2-9, provides the mounting hardware only to mount a 3.5-inch disk drive, see Table 2-8, into a 5.25-inch media bay. A disk drive is not included if you order the feature.

Table 2-9 Disk mounting hardware

Feature code	Description
6572	Mounting Hardware to install 3.5" Disk Drive in 5.25" Media Bay

2.6 RAID option

Internal hardware RAID is not available on the IBM System p5 185 system. If RAID functionality is needed, an additional RAID adapter card can be installed to support an external RAID device as shown in Table 2-10.

Table 2-10 Raid adapter options

Feature code	Description
1913	PCI-X DDR Dual Channel Ultra320 SCSI RAID Adapter

2.7 Operating system requirements

This section provides information about your optional choice to choose the appropriate operating system version of your need.

2.7.1 AIX 5L

AIX 5L has been developed and enhanced specifically to exploit and support the extensive RAS features on IBM System p systems. At the time of writing, IBM AIX 5L Version 5.2 and Version 5.3 is supported on the IBM System p5 185 system.

The increased capacity of DVD means fewer media to handle when installing from DVD media. If you want to receive the AIX 5L software on DVD media, order the DVD preference feature FC 3435.

The IBM System p5 185 system requires AIX 5L Version 5.3 Maintenance Package 5300-04 (IY77270) or AIX 5L Version 5.2 Maintenance Package 5200-08 (IY77273) or later.

The system requires the following media:

- AIX 5L for POWER Version 5.2 5765-E62, (CD# LCD4-1133-08) or later
- AIX 5L for POWER Version 5.2 5765-E62, (DVD# LCD4-7549-01)
- AIX 5L for POWER Version 5.3 5765-G03, (CD# LCD4-7463-05) or later
- AIX 5L for POWER Version 5.3 5765-G03, (DVD# LCD4-7544-01)

IBM periodically releases maintenance packages for the AIX 5L operating system. These packages are available on CD-ROM (FC 0907), or they can be downloaded from the Internet at:

`http://techsupport.services.ibm.com/server/fixes`

You can also get individual operating system fixes and information about obtaining AIX 5L service at this site. In AIX 5L Version 5.3, the **suma** command is also available to help the administrator automate the task of checking and downloading operating system downloads. For more information about the **suma** command functionality. See 3.2.4, “Service Update Management Assistant” on page 40 for more information.

If you have problems downloading the latest maintenance level, ask your IBM Business Partner or IBM representative for assistance.

2.7.2 Linux

Linux is one of the world's fastest-growing operating system. IBM is a strong supporter of Linux as a way to promote open standards. Open standards allow the interoperability of various applications, technologies, and computer devices, providing clients with a wider choice and flexibility to deploy applications. Because of this, Linux is a key player in the on demand strategy from IBM, because it provides a flexible computing environment.

The IntelliStation POWER 185 supports the AIX 5L and Linux operating system. At the time of writing, Red Hat Enterprise Linux and SUSE Linux Enterprise Server (SLES) are the supported Linux operating systems on the IntelliStation POWER 185 system.

For the IntelliStation POWER 185, Linux distributions were available through Novell SUSE and Red Hat at the time this publication was written. The IBM IntelliStation POWR 185 workstation requires the following version of Linux distributions:

- Red Hat Enterprise Linux AS 4 U3 for POWER, or later
- SUSE Linux Enterprise Server 9 SP3 for POWER, or later

You can find information about features and external devices that are supported by Linux on the IBM System p5 185 server at:

http://www.ibm.com/servers/eserver/pseries/linux/

You can find information about SUSE Linux Enterprise Server 9 at:

http://www.novell.com/products/linuxenterpriseserver/

You can find information about Red Hat Enterprise Linux AS for pSeries from Red Hat at:

http://www.redhat.com/software/rhel/details/

For the latest in IBM Linux news, subscribe to the Linux Line at:

https://www14.software.ibm.com/webapp/iwm/web/preLogin.do?source=linuxline

Many of the features described in this document are operating system dependant and might not be available on Linux. For more information, see:

http://www.ibm.com/servers/eserver/linux/power/whitepapers/linux_overview.html

Note: The GXT4500P (#2842) and GXT6500P (FC 2843) are not supported by SUSE Linux Enterprise Server 9 SP3 for POWER, or later, or Red Hat Enterprise Linux AS 4 U3 for POWER, or later.

IBM supports only the Linux systems of clients with a SupportLine contract that covers Linux. Otherwise, the Linux distributor should be contacted for support.

2.8 Service processor

The service processor is a specialized device that is situated on the system board and provides a number of different functions, as follows:

- Immediately after power on, a function of the service processor controls the powering up of all devices needed during the boot process. When the service processor has completed its tasks, it checks for CPU and memory resources and then tests them. After the CPU and memory tests have completed, the service processor then hands the rest of the boot process over to system firmware. This changeover occurs when the 9*xxx* LED codes become E*xxx* codes.

- With AIX 5L in control of the machine, the service processor is still working and checking the system for errors. Also, the surveillance function of the service processor is monitoring AIX 5L to check that it is still running and has not stalled.

2.8.1 Operator control panel

The service processor provides an interface to the control panel that is used to display server status and diagnostic information. The IBM System p5 185 control panel is packaged so that it fits into a smaller space. In the normal position, the control panel is seated inside the chassis on the left side below the front door, as shown in Figure 1-1 on page 3. The LCD display is invisible from the front. To read the LCD display, the client or engineer needs to pull the operator panel out toward the front.

Accessing the operator panel

To access the operator panel, use the following steps:

1. Press inward on the spring-loaded tab, located on the right side of the control panel, so that it pops out slightly.
2. Pull out the control panel toward the front of the server until it can be pivoted downward on its hinge.
3. To move the control panel back into the device enclosure, lift the control panel up to align it with the opening and push it into place until you feel the tab lock.

Primary control panel functions

The primary control panel functions are defined as functions 01 to 20, including options to view and manipulate IPL modes, server operating modes, IPL speed, and IPL type.

The following list describes all of the available primary functions:

- Function 01: Display selected IPL type, system operating mode, and IPL speed
- Function 02: Select IPL type, IPL speed override, and system operating mode
- Function 03: Start IPL
- Function 04: Lamp Test
- Function 05: Reserved
- Function 06: Reserved
- Function 07: SPCN functions
- Function 08: Fast Power Off
- Functions 09 to 10: Reserved
- Functions 11 to 19: System Reference Code
- Function 20: System type, model, feature code, and IPL type

For detailed information about each control panel function and the available values, select **Service provider information** → **Reference information** → **Service functions** → **Control panel functions** from the IBM Systems Hardware Information Center Web site at:

http://publib.boulder.ibm.com/infocenter/eserver/v1r3s/index.jsp?lang=en

3

RAS and manageability

The reliability, availability, and serviceability (RAS) philosophy of IBM employs a reasoned and organized architectural approach designed to:

- Avoid problems where possible with a well-engineered design.
- Attempt to recover or to retry the operation if a problem occurs.
- Diagnose the problem and to reconfigure the system as needed.
- Initiate a repair and call for service automatically.

As a result, IBM servers are designed for reliable, robust operation in a wide variety of demanding environments.

This chapter provides more detailed information about the IBM System p5 185 system's reliability, availability, and serviceability features. It discusses several features about the benefits that are available when using IBM AIX 5L.

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3.1 Reliability, fault tolerance, and data integrity

The reliability of the IBM System p5 185 system starts with components, devices, and subsystems that are designed to be fault-tolerant. During the design and development process, subsystems go through rigorous verification and integration testing processes. During system manufacturing, systems go through a thorough testing process that is designed to help ensure the highest level of product quality.

The features that are designed to provide fault tolerance and ensure data integrity include:

- ECC also provides double-bit memory error detection that helps protect data integrity in the event of a double-bit memory failure.
- Disk mirroring and disk controller duplexing are also provided by the AIX 5L operating system.
- The journaled file system maintains file system consistency and reduces the likelihood of data loss when the system is abnormally halted due to a power failure.

3.1.1 Memory error correction extensions

There are several levels of memory protection implemented on the IBM System p5 185 server. From the internal L1 caches to the main memory, several features are implemented to assure data integrity and data recovery in case of memory failures, including:

- The IBM System p5 185 server uses error checking and correcting (ECC) circuitry for memory reliability, fault tolerance, and integrity.
- Memory has single-error-correct and double-error-detect ECC circuitry designed to correct single-bit memory failures. The *double-bit* detection is designed to help maintain data integrity by detecting and reporting multiple errors beyond what the ECC circuitry can correct.

3.1.2 First-failure data capture

Diagnosing problems in a computer is a critical requirement for autonomic computing. The first step to producing a computer that truly has the ability to self-heal is to create a highly accurate way to identify and isolate hardware errors. IBM has implemented a server design that builds in hardware error-check stations that capture and help to identify error conditions within the server. Each of these checkers is viewed as a diagnostic probe into the server, and, when coupled with extensive diagnostic firmware routines, enables quick and accurate assessment of hardware error conditions at run time. First-failure data capture (FFDC) provides the following key functions:

- FFDC check stations are carefully positioned within the server logic and data paths to help ensure that potential errors can be quickly identified and accurately tracked to an individual field replaceable unit (FRU).
- These checkers are collected in a series of fault-isolation registers (FIRs), where they can easily be accessed by the service processor.
- All communication between the service processor and the FIR is accomplished *out of band*. That is, operation of the error-detection mechanism is transparent to an operating system. This entire structure is *below the architecture* and is not seen, nor accessed, by system-level activities.

3.1.3 Service processor

The service processor included in the IBM System p5 185 server is designed for an immediate means to diagnose, check the status, and sense the operational conditions. The service processor includes the following features:

- The service processor enables firmware and operating system surveillance, several environmental monitoring, reset, boot features, remote maintenance, and diagnostic activities, including console mirroring.
- The service processor can place calls to report surveillance failures, critical environmental faults, and critical processing faults.

3.1.4 Fault monitoring functions

A few of the fault monitoring systems in the IBM System p5 185 server include:

- Built-in self-test (BIST) and power-on self-test (POST) check the processor, memory, and associated hardware required for proper booting of the operating system every time the system is powered on. If a noncritical error is detected or if the errors occur in resources that can be removed from the system configuration, the booting process is designed to proceed to completion. The errors are logged in the system nonvolatile RAM (NVRAM).
- Disk drive fault tracking can alert the system administrator of an impending disk failure before it impacts client operation.
- The AIX 5L log (where hardware and software failures are recorded and analyzed by the Error Log Analysis, ELA, routine) warns the system administrator about the causes of system problems. This also enables IBM service representatives to bring along probable replacement hardware components when a service call is placed, thus minimizing system repair time.

3.1.5 Environmental monitoring functions

Some of the environmental monitoring functions available for the IBM System p5 185 server include:

- Temperature monitoring increases the fan speed rotation when the ambient temperature is above the normal operating range.

  Temperature monitoring warns the system administrator of potential environmental-related problems (for example, air conditioning and air circulation around the system) so that appropriate corrective actions can be taken before a critical failure threshold is reached. It also performs an orderly system shutdown when the operating temperature exceeds the critical level.
- Fan speed monitoring provides a warning and an orderly system shutdown when the speed is out of the operational specification.
- Voltage monitoring provides a warning and an orderly system shutdown when the voltages are out of the operational specification.

3.1.6 Error handling and reporting

In the unlikely event of a system hardware or environmentally-induced failure, the system runtime error capture capability systematically analyzes the hardware error signature to determine the cause of failure. The error capture capability includes the following functions:

- The analysis is stored in the system NVRAM. When the system can be rebooted successfully either manually or automatically, the error is reported to the AIX 5L operating system.
- Error Log Analysis (ELA) can be used to display the failure cause and the physical location of failing hardware.
- A hardware fault also turns on the Attention Indicator (one located on the front of the system unit and one on each light strip) to alert the user of an internal hardware problem. The indicator can also be turned on by the operator as a tool to allow system identification. For identification, the indicators flashes, while the indicator is on solid when an error condition occurs.

3.1.7 Availability enhancement functions

The system auto-restart (reboot) option, when enabled, can reboot the system automatically following an unrecoverable software error, software hang, hardware failure, or environmentally-induced (ac power) failure.

3.2 Serviceability

The IBM System p5 185 server is designed for customer setup (CSU) of the machine and for subsequent addition of most features (adapters/devices). The serviceability features include:

- The diagnostics consist of stand-alone diagnostics, which are loaded from the DVD-ROM drive, and online diagnostics.
- Online diagnostics, when installed, are resident with AIX 5L on the disk or system. They can be booted in single-user mode (service mode), run in maintenance mode, or run concurrently (concurrent mode) with other applications. They have access to the AIX 5L error log and the AIX 5L configuration data.
  - Service mode enables the checking of system devices and features.
  - Concurrent mode enables the normal system functions to continue while selected resources are being checked.
  - Maintenance mode enables the checking of most system resources.
- The System Management Services (SMS) error log is accessible from the SMS menu for tests performed through SMS programs. For results of service processor tests, access the error log from the service processor menu.

Increasing service productivity means that the system is up and running for a longer time. The IBM System p5 185 server improves service productivity by providing the functions that are described in the following sections.

Error indication and LED indicators

The IBM System p5 185 server is designed for client setup of the machine and for the subsequent addition of most hardware features. The IBM System p5 185 server also enables clients to replace service parts (customer-replaceable unit). To accomplish this, the IBM System p5 185 server provides internal LED diagnostics that identify parts that require service. Attenuation of the error is provided through a series of light attention signals, starting

on the exterior of the system (system attention LED) located on the front of the system, and ending with an LED near the failing field replacable unit (FRU).

For more information about customer-replaceable units, including videos, see:

http://publib.boulder.ibm.com/eserver

System attention LED

The attention indicator is represented externally by an amber LED on the operator panel and the back of the system unit. It is used to indicate that the system is in one of the following states:

- Normal state: LED is off.
- Fault state: LED is on solid.
- Identify state: LED is blinking.

Additional LEDs on I/O components, such as PCI-X slots and disk drives, provide status information, such as power, hot-swap, and need for service.

3.2.1 Service Agent

Service Agent is available at no additional charge. When installed on an IBM System p5 185 server or an IBM System p5 system, the Service Agent can enhance the ability of IBM to provide the system with maintenance service.

The Service Agent:

- Monitors and analyzes system errors, and if needed, places a call to IBM Service automatically, without client intervention.
- Helps reduce the effect of business disruptions due to unplanned system outages and failures.
- Performs problem analysis on a subset of hardware-related problems and, with client authorization, can report the results to IBM Service automatically.

3.2.2 IBM Director

IBM Director for pSeries V5.10, a major new release of proven systems management solution from IBM, is available to IBM System p clients at no additional charge. While maximizing system availability, Director is designed to reduce the cost and complexity of management by providing comprehensive yet easy-to-use administration of the entire environment from a single point of control. It features an open, integrated toolset with new functions and improved ease of use that help you get started faster and be more productive.

With IBM Director, administrators can view, update, and track the configuration of remote systems; monitor usage and performance of critical components such as processors, disks, and memory; issue commands; and configure automatic responses to system conditions or problems. IBM Director also complements and integrates with higher-level management software such as Tivoli® and high-performance computing management software such as IBM Cluster Systems Management.

The open design and support for industry standards of IBM Director enables heterogeneous hardware management with broad platform and operating system support, protecting clients' IT investment. IBM Director enables monitoring and event management across a heterogeneous IT environment, including Intel®, and IBM POWER systems that support AIX 5L, Linux, i5/OS®, and Windows from a single Java™-based user interface. From one central console, users can monitor system resources, inventory, and events; manage tasks; and

issue corrective actions, distributed commands, and hardware control for both servers and storage.

A redesigned version of IBM Director focuses on ease-of-use and delivers an even more open, integrated toolset to simplify system administration across all IBM System p platforms and several operating systems. IBM Director V5.10 includes:

- Broader platform coverage for use in a heterogeneous environment that includes IBM System p5, IBM @server p5, IBM @server i5, and IBM @server pSeries
- A new streamlined interface to boost productivity
- A new command-line interface, in addition to the graphical interface
- Lightweight agents for easy deployment

For more information, visit the following Web site at:

http://www-03.ibm.com/servers/eserver/about/virtualization/systems/pseries.html

3.2.3 IBM customer-managed microcode

The IBM System p customer-managed microcode is a methodology that enables you to manage and install microcode updates on systems and associated I/O adapters. For more information, see the IBM microcode update Web site at:

http://techsupport.services.ibm.com/server/mdownload

IBM provides service tools that can assist you in determining microcode levels and updating systems with the latest available microcode. To determine which tool to use in a specific environment, visit:

http://techsupport.services.ibm.com/server/mdownload/mcodetools.html

3.2.4 Service Update Management Assistant

The Service Update Management Assistant (SUMA) helps system administrators retrieve maintenance updates from the Web. SUMA offers flexible options that let clients set up policies to automate the download of fixes to their systems. SUMA policies can be scheduled to periodically check the availability of specific new fixes (APAR, PTF, or fileset), critical or security fixes, or an entire maintenance level. A notification e-mail can be sent detailing the updates that are needed when comparing available fixes to installed software, a fix repository, or a maintenance level. SUMA provides the following benefits:

- Moves administrators away from the task of manually retrieving maintenance updates from the Web.
- Optionally schedules policy to run periodically, for example, to download the latest critical fixes weekly.
- Compares fixes needed against software inventory, fix repository, or a maintenance level.
- Sends mail notification after a fileset preview or download operation.
- Allows for FTP, HTTP, or secure HTTPS transfers.
- Provides the same requisite checking as the IBM fix distribution Web site.

SUMA is available through SMIT menus (**smitty suma**) or a command line interface.

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this Redpaper.

IBM Redbooks

For information about ordering these publications, see “How to get IBM Redbooks” on page 43. Note that some of the documents referenced here might be available in softcopy only.

- *Advanced POWER Virtualization on IBM System p5*, SG24-7940
- *Virtual I/O Server Integrated Virtualization Manager*, SG24-4061
- *Partitioning Implementations for IBM @server p5 Servers*, SG24-7039
- *Advanced POWER Virtualization on IBM @server p5 Servers: Architecture and Performance Considerations*, SG24-5768
- *IBM @server pSeries Sizing and Capacity Planning: A Practical Guide*, SG24-7071
- *IBM @server p5 590 and 595 System Handbook*, SG24-9119
- *IBM @server p5 590 and 595 Technical Overview and Introduction*, REDP-4024
- *IBM @server p5 510 Technical Overview and Introduction*, REDP-4001
- *IBM @server p5 520 Technical Overview and Introduction*, REDP-9111
- *IBM @server p5 550 Technical Overview and Introduction*, REDP-9113
- *IBM @server p5 570 Technical Overview and Introduction*, REDP-9117
- *IBM System p5 505 Express Technical Overview and Introduction*, REDP-4079
- *IBM System p5 510 and 510Q Technical Overview and Introduction*, REDP-4136
- *IBM System p5 520 and 520Q Technical Overview and Introduction*, REDP-4137
- *IBM System p5 550 and 550Q Technical Overview and Introduction*, REDP-4138
- *IBM System p5 560Q Technical Overview and Introduction*, REDP-4139

Other publications

These publications are also relevant as further information sources:

- *7014 Series Model T00 and T42 Rack Installation and Service Guide*, SA38-0577, includes information regarding the 7014 Model T00 and T42 Rack in which this server can be installed.
- *7316-TF3 17-Inch Flat Panel Rack-Mounted Monitor and Keyboard Installation and Maintenance Guide*, SA38-0643, includes information regarding the 7316-TF3 Flat Panel Display, which can be installed in your rack to manage your system units.
- *IBM @server Hardware Management Console for pSeries Installation and Operations Guide*, SA38-0590, provides information to operators and system administrators on how to use a IBM Hardware Management Console for pSeries (HMC) to manage a system. It also discusses the issues that are associated with logical partitioning planning and implementation.

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- *Planning for Partitioned-System Operations*, SA38-0626, provides information to planners, system administrators, and operators about how to plan for installing and using a partitioned server. It also discusses some issues that are associated with the planning and implementing of partitioning.
- *RS/6000 and @server pSeries Diagnostics Information for Multiple Bus Systems*, SA38-0509, includes diagnostic information, service request numbers (SRNs), and failing function codes (FFCs).
- *System p5, @erver p5 Customer service support and troubleshooting*, SA38-0538, includes information regarding slot restrictions for adapters that can be used in this system.
- *System Unit Safety Information*, SA23-2652, includes translations of safety information that are used throughout the system documentation.

Online resources

These Web sites and URLs are also relevant as further information sources:

- AIX 5L operating system maintenance packages downloads

  http://www.ibm.com/servers/eserver/support/unixservers/aixfixes.html
- Autonomic computing on IBM @server pSeries servers

  http://www.ibm.com/autonomic/index.shtml
- Ceramic Column Grid Array (CCGA), see IBM Chip Packaging

  http://www.ibm.com/chips/micronews
- Copper circuitry

  http://domino.research.ibm.com/comm/pr.nsf/pages/rsc.copper.html
- IBM @server p5 Hardware documentation

  http://publib16.boulder.ibm.com/pseries/en_US/infocenter/base/
- IBM System p5 Information Centers

  http://publib.boulder.ibm.com/eserver/
- IBM System p5, @server p5, pSeries and RS/6000 microcode update

  http://techsupport.services.ibm.com/server/mdownload2/download.html
- IBM System p5, @server p5 and pSeries support

  http://www.ibm.com/servers/eserver/support/unixservers/index.html
- IBM @server support: Tips for AIX 5L administrators

  http://techsupport.services.ibm.com/server/aix.srchBroker
- IBM online sales manual

  http://www.ibmlink.ibm.com
- Linux for IBM System p5

  http://www.ibm.com/systems/p/linux/
- Microcode Discovery Service

  http://techsupport.services.ibm.com/server/aix.invscoutMDS
- The LVT is a PC based tool intended assist you in logical partitioning

  http://www.ibm.com/servers/eserver/iseries/lpar/systemdesign.htm

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IBM System p5 185 Technical Overview and Introduction

Redpaper

Application serving in distributed environments

Exeptional price/performance through IBM PowerPC technology

Flexibility to support AIX 5L and Linux applications

This document is a comprehensive guide that covers the IBM System p5 185 server. It introduces major hardware offerings and discusses their prominent functions.

Professionals who want to acquire a better understanding of IBM System p5 185 product should read this document. The intended audience includes:

- Clients
- Sales and marketing professionals
- Technical support professionals
- IBM Business Partners
- Independent software vendors

This document expands the current set of IBM System p documentation and provides a desktop reference that offers a detailed technical description of the IBM System p5 185 server.

This publication does not replace the latest IBM System p marketing materials and tools. It is intended as an additional source of information that you can use, together with existing sources, to enhance your knowledge of IBM server and workstation solutions.

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